CHAPTER 23
PART 1
COMMUNICATIONS
(COLLINS)

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CHAPTER 23 - PART 1

COMMUNICATIONS - COLLINS INSTALLATION

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COMMUNICATION AERIALS - ADJUSTMENT/TEST

1. General

In-situ testing of aerials is to be done at the periods specified in the Aircraft Flexible Maintenance Schedule (P/N: AFMS-800XP).

To make sure that a particular aerial installation is completely serviceable, do one or more of the following tests:

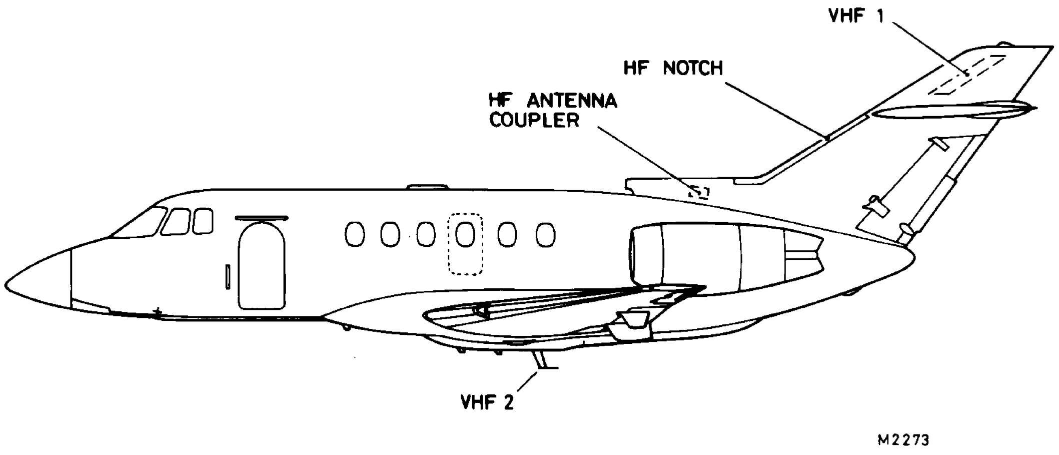
(1)	Low and/or High resistance tests	Done with the aerial feeder cable disconnected at the aerial.
(2)	Voltage standing wave ratio (VSWR) test	Done at the end of the feeder cable distant from the aerial.

2. Aerials and test procedures *(Figure 501)*

Equipment/ Materials	Part/Item No.
Low voltage bonding test ohmmeter	Local supply
250 volt high resistance bonding test ohmmeter	Local supply
VSWR bridge for all frequencies except ’L’ band where a slotted line should be used	Local supply

Refer to the appropriate Vendor’s instruction manual supplied with the test equipment for the test procedure.

System	Aerial	Test
VHF	Blade or in Overfin	Make sure the VSWR on the system is less than 2:1 at frequencies at the bottom, middle and top of the VHF Comm band.
VHF	Blade	Make sure the VSWR on the system is less than 2:1 at frequencies at the bottom, middle and top of the band for the VHF section of the aerial.



General arrangement of communications aerials

Figure 501

HF COMMUNICATION SYSTEM (KING KHF950) - DESCRIPTION AND OPERATION

1. General

The HF system permits two-way telephone communication in a wide band of frequencies. The band of frequencies covers from 2MHz to 29.99MHz in 280,000 increments of 100Hz.

Audio and press-to-talk (PTT) are provided by the audio integrating system (Chapter 23, AUDIO INTEGRATING SYSTEM).

The HF system can be installed as a dual installation made up of HF No.1 and HF No.2. Each installation uses:-

- a control unit
- power amplifier/antenna coupler
- a receiver/exciter
- a control adapter
- a bridging amp (dual installation only)

A single aerial is used which necessitates the use of an antenna changeover unit when a dual system is installed.

Both HF No.1 and HF No.2 systems can be monitored by a selective calling (SELCAL) system (Chapter 23, SELCAL SYSTEM).

2. Description *(Figure 3)*

The HF No.1 system is supplied by 28 volts d.c. from PS-1a through a circuit breaker. This goes to the bus adapter and the receiver/exciter. It also goes to the coil of the PTT relay. The PA/antenna coupler gets its power from the same busbar through a fuse.

Supply for the HF No.2 (when installed) is distributed in the same way but is supplied from PS-2a.

The PTT No.1 relay energizes when HF1 is selected on any audio selector panel (ASP) and a pilot's PTT switch is operated.

The PTT No.2 relay energizes when HF2 is selected on any ASP and a pilot's PTT switch is operated.

The equipment operates in the 2.0000 to 29.9999 MHz band and can be directly tuned, in 100Hz increments to any one of 280,000 channels. Nineteen of these channels may be preset by the pilot either on the ground or in the air. In addition, all 176 International Telecommunications Union (ITU) maritime radio/telephone network channels have been stored in a non-volatile memory along with the appropriately paired transmit and receive frequencies. The 19 preset channels and the 176 ITU channels are kept in the memory even when the system is switched off.

Operating modes are single sideband (LSB and USB), amplitude modulation (AM), and TEL A3J. The TEL mode is used for ITU public maritime or other radio telephone services.

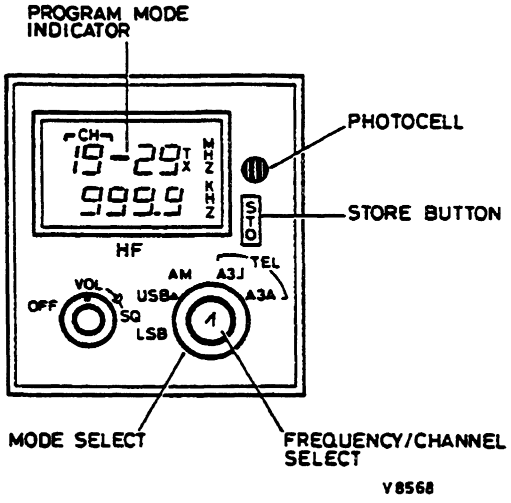
The HF system is interconnected with the audio integrating system ASPs for distribution. Selective calling (SELCAL) decoding equipment is connected to the system to provide aural and visual indication that a ground station is calling. The HF system also forms part of the air-to-ground cabin telephone link.

The Rx/exciter sends its RF energy to and gets it from the PA/antenna coupler through the bus adapter. The PA/antenna coupler is connected to the antenna through the changeover relay.

3. Component description *(Figure 2)*

A. Control Unit

The KFS 594 control unit *(Figure 1)* has all the controls necessary to operate the system; these include a rotary mode control with a frequency control mounted concentrically, a multi-function STO button, concentrically-mounted rotary volume and squelch controls, and a gas-discharge display. Display brightness is controlled automatically by an integral photocell dimmer circuit; front panel integral lighting is controlled by the aircraft avionics dimmer circuits. In operation the unit controls the non-volatile storage of frequency, mode and channel data, provides synthesizer serial data tuning logic, transmit mode control logic and band switching.



KFS 594 control unit
Figure 1

The controls function as follows:-

Mode select

This is a five-position rotary switch selecting the following operating modes:-

LSB	Lower sideband (this position is internally disabled. Flashing 'E' shows when selected, and USB mode enabled instead).
USB	Upper sideband.
AM	Amplitude modulation (older AM or AME stations).
TEL A3J	Suppressed carrier single sideband.
TEL A3A	Reduced carrier single sideband (position disabled. Flashing 'E' shows when selected).

LSB, USB and AM mode selections show directly selectable frequencies on one of 19 preset channels; TEL A3J mode shows an ITU channel number.

Frequency/channel select

The frequency/channel control, which is a 12-position rotary switch, is concentric with the mode select control; momentary depression of the control causes a cursor (a flashing digit) to scan from left to right and top to bottom on the display and, when rotated, increments or decrements the selected (flashing) digit. This switch provides clarifier function when in sideband modes (not TEL A3J or A3A).

STO button

The STO button has four functions as follows:-

- When the system is in channel mode, pushing STO causes the control unit display to show the legend 'TX' together with the transmit frequency, while the receiver monitors the transmit frequency, (for instance, a duplex channel).
- Pushing while the transmitter is keyed transmits a 1000-Hz tone to break the squelch of some receiving stations.
- Pushing while the system is in program mode enters the selected frequency into the channel being preset. (Changing the frequency of a programmable channel automatically selects program mode, as shown by a flashing dash adjacent to the channel number).
- Used to exit clarifier operation.

On-OFF/VOLume

A rotary control mounted concentrically with the SQuelch control. Clockwise rotation applies system power; further clockwise movement increases audio volume.

SQuelch control

A rotary control concentric with the on-OFF/VOLume control. Clockwise rotation reduces the squelch threshold.

Displays

The multi-function gas-discharge display gives system status indication. Referring to *Figure 1*, in sideband and AM modes the upper display contains the channel number (CH), the program mode annunciator (a flashing 'dash') and the first two digits (MHz) of the operating frequency. The lower display shows the remainder of the frequency (kHz). In TEL mode, the upper display is blank whilst the lower display shows the radiotelephone ITU channel number.

B. Control adapter

The KA 594 control adapter changes the serial control data from the KFS 594 control unit to signals that are compatible with the KTR 953 receiver/exciter; conversely, frequency/channel and tune monitoring data are fed back to the control unit.

C. Receiver/exciter

The KTR 953 receiver/exciter contains the receiver and supplies the low-power RF signal to the remote power amplifier/antenna coupler, through a nominal 50-ohm impedance coaxial feeder.

The receiver exciter includes a fast warm-up oven-controlled oscillator to give a precise frequency reference required for the 100Hz frequency synthesizer.

The unit has a dual-conversion receiver that gives audio and sidetone outputs of between 10 and 100 mW, with a SELCAL output of 10mW, all at 500 ohms impedance.

D. Power amplifier/antenna coupler

The KAC 952 amplifier/antenna coupler is installed adjacent to the HF notch aerial. The unit has a solid-state RF amplifier which increases the signal from the receiver/exciter to 150W peak envelope power for sideband operation. When operating in AM mode, this continuous rating is reduced after a period of time to stop overheating the power amplifier. The reduction rate depends upon ambient temperature; after 7 minutes transmission in AM mode, is approximately one third of normal. A recommended duty cycle to maintain maximum power outputs is 3 minutes on and 3 minutes off.

The microprocessor-controlled antenna coupler tunes the notch aerial to any frequency between 2.0000 and 29.9999 MHz, maintaining a typical 1.5:1 VSWR (3.6:1 maximum). Tuning time is a nominal 3 seconds, during which time RF output power is limited to between 5 and 10W. The coupler is bypassed during receive when operating in semi-duplex or receive-only channelized modes.

Fault monitoring (all display digits flashing) will annunciate coupler overvoltage, power amplifier over-temperature, transmitter failure, or the inability of the coupler to tune the aerial.

E. Bridging amplifier

Two KA 158 bridging amplifiers are installed directly, one on each power amplifier/antenna coupler, to permit both receivers in a dual system to operate from one antenna. The wideband amplifier has an input impedance of 600 ohms and an output impedance of 50 ohms.

F. Antenna changeover relay unit

The KA162 antenna changeover relay is installed adjacent to the HF aerial and both PA/antenna couplers. Two coaxial input connectors and a porcelain output termination permit the connection of the dual HF system to one aerial. When relaxed the changeover relay favours the HF No.1 system. When the HF No.2 system is keyed, the relay operates and connects HF No.2 PA/antenna coupler to the aerial. The relay unit includes capacitors to enable tuning of the HF notch aerial.

4. Operation *(Figure 3)*

NOTE: When two HF systems are installed, HF No.2 operates in a similar manner to HF No.1 except that the power is supplied from busbar PS-2a.

With PS-1a busbar energized and the control unit switched on the HF1 system is operative. A warm up period of approximately three minutes is required for stable frequency operation. The audio integrating system must be operational before the HF system can be operated.

When the system is first energized, warmed up and the PTT key is pressed, the coupler will tune the antenna. When a new channel or frequency is selected and the PTT key is pressed the coupler will re-tune the antenna. When an existing channel or frequency is being used and the coupler senses an improper match when the PTT key is pushed, the antenna will be re-tuned.

Until the system has warmed up no frequencies or channel numbers are shown. When the system has warmed up the display shows the last channel or frequency used.

The system is operated in two ways:

- Direct tuning a frequency
- Channel operation and programming.

Direct tuning

In direct tune operation the pilot may select directly any of 280,000 frequencies in the range of 2.0MHz to 29.99MHz.

Channel operation

The 19 programmable channels available can be easily programmed on the ground or in the air. Two types of channels can be programmed:

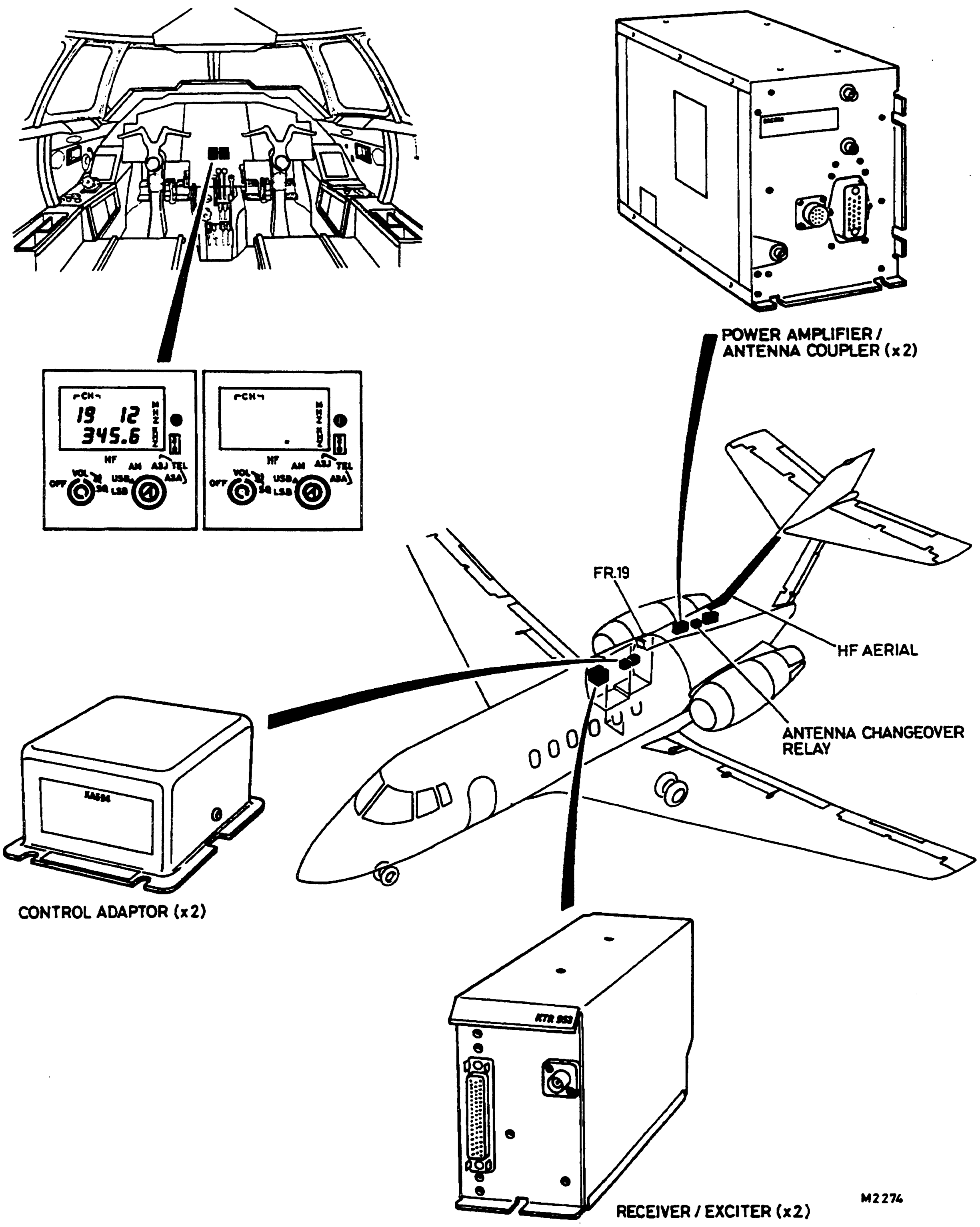
- Simplex
- Semi-duplex.

Simplex

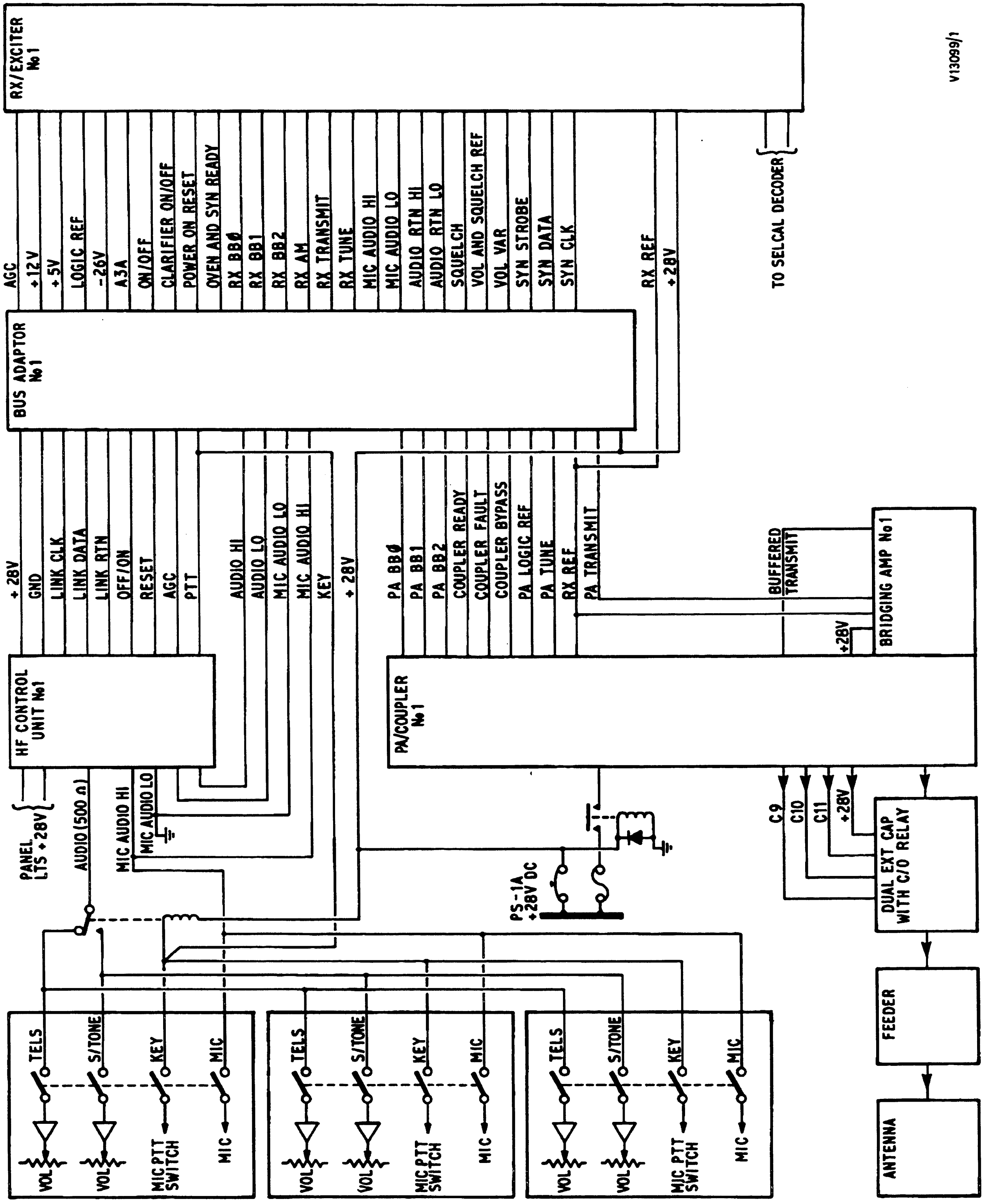
The pilot programs the same frequency in receive and transmit.

Semi-duplex

The pilot programs two different frequencies, one for receive and one for transmit.



Component location (dual system)
Figure 2



HF No.1 system block diagram
Figure 3

HF COMMUNICATIONS SYSTEM (KING KHF950) - TROUBLESHOOTING

1. General

This section addresses HF communication system Electromagnetic Interference (EMI) with other onboard avionics and electrical systems, including the fuel quantity indication and engine indication systems.

Due to the amount of transmitted power, frequency spectrum involved and the design characteristics of the HF antenna, HF transmitters are one of the most troublesome sources of EMI. They often cause fluctuations in fuel quantity indication, engine indication and other airplane systems indication. Most of these fluctuations present themselves as a spike in fuel quantity or engine indication when transmission is occurring, or as fluctuations that are in synchronization with the voice modulation and return to the original indication when transmission ends.

2. Procedure

The susceptibility of onboard avionics and electrical systems to EMI produced by the HF communication system can be checked by doing the HF Communication System Functional Test (23-10-18, ADJUSTMENT/TEST). Using this procedure check for avionics and electrical system indication fluctuation while transmitting on random frequencies between the range of 3.000 MHz and 25.000 MHz.

NOTE: When transmitting in the USB (A3J) mode talk loudly and observe the suspect indication for signs of EMI fluctuation, outside of the noted limits.

NOTE: When transmitting in the AM (A3H) mode, key the transmitter (modulatation is not necessary) and observe the suspect indication for signs of EMI fluctuation for trouble shooting purposes only.

NOTE: The KHF-950 HF / SSB Communication System with KFS 594 Control Unit should not be operated in the AM (A3A) Mode (As per the Bendix/King KHF-950 System Operational and Installation Manual).

Raytheon Aircraft Company (RAC) considers the following indication fluctuations to be normal and acceptable providing that the indicators return to normal reading when the HF transmission ceases, (the interference should be noted by the Flight Crew but it is not considered to be excessive or detrimental to flight safety).

- 200 lbs. on fuel Quantity indicators
- 1% on N_1 indicators
- ½% on N_2 indicators
- 50º C on ITT indicators
- 10% of the indicator maximum limit is the amount of EMI permitted in other cockpit or cabin indicators (i.e. oil temperature, oil pressure, flap position and cabin/duct temperature, etc.)
- No fluctuations are permitted in navigational indications (i.e. VOR, LOC, GPS, Glide Slope, etc.) except as permitted in the Aircraft Flight Manual Limitations section.

NOTE: Fluctuations in engine indications is permissible as listed above, however NO fluctuations are permitted in actual engine performance.

Fluctuations in excess of the above referenced limits or indications that do not return to normal when HF transmission ceases are not acceptable and the HF should be disabled until the affected airplane system is checked by an Authorized Service Center.

There are several troubleshooting points that should be kept in mind when trying to eliminate or reduce the amount of interference on any airplane that is experiencing indicator fluctuations while transmitting on the HF Comm.

(1) It is possible that the excessive EMI may be caused by an internal condition to one of the HF system components.

(2) It is most likely that poor electrical bonding is the cause of the condition and the bonding of the HF Comm and affected airplane systems should be thoroughly investigated. Proper electrical bonding of all HF system components, accessories and the antenna itself cannot be overemphasized. Good RF bonding of the HF equipment to the airplane fuselage is basic in achieving maximum efficiency from the system and eliminating any possible EMI to other systems in the airplane.

   (a) Make sure that all paint, corrosion, etc., is removed from all equipment bonding points. This would include, (depending on the particular HF installation), the HF transceiver, the HF receiver/exciter, the HF power amplifier, the HF antenna coupler, the HF bridging amplifier and the HF antenna changeover unit.

   (b) All electrically bonded HF components should have less than 1.5 milliohms (0.0015 ohms) resistance to its mating surface. These mating surfaces should in turn have less than 1.5 milliohms resistance to the airframe.

   (c) The most common HF antenna installed on the Hawker 800XP is located in the leading edge of the vertical stabilizer. The antenna extends from frame 21 to the horizontal stabilizer, (approximately 100 in. (2.54 m)), and except for the upper end of the antenna, is insulated from the adjacent structure by fiberglass inserts. An antenna design of this type is referred to as a “shunt” antenna. Such an antenna produces no drag, exhibits an omnidirectional radiation pattern and if well bonded can provide good operational efficiency. Shunt antennas are suitable for high altitude airplane use because they do not develop extremely high voltages, however they do develop extremely high RF currents. Due to these high RF currents, good electrical bonding of the antenna is essential. The antenna is electrically bonded to the airframe at the top of the antenna.

   (d) If the HF antenna feed wire is removed from the antenna feed terminal at the base of the antenna, the antenna feed terminal should measure less than 1.5 milliohms resistance to the airframe.

   (e) All components of the antenna are designed and manufactured by RAC. In operation, RF energy from the HF is fed to the antenna at the antenna base. Due to the design characteristics of the antenna the entire airplane skin acts as a radiator for the HF signal. This makes it imperative that all airplane sub assemblies (skins, panels, control surfaces, doors, etc.) are bonded together to eliminate static buildup and energy re-radiation which can adversely affect the HF system performance and contribute to HF interference in other systems. These items should be checked for proper electrical bonding values as detailed in the Aircraft Maintenance Manual (AMM), Chapter 20. Proper electrical bonding of the affected airplane systems is also required to reduce EMI effect. All metallic components of the affected airplane system should have less than 1.5 milliohms (0.0015 ohms) resistance to the airframe.

(3) It is also important to make sure that the applicable airplane wiring is secure and correctly terminated. All shielded wiring in the affected airplane system should be properly terminated and grounded as shown in the applicable airplane routing chart. All shielded wiring in the HF system should be properly terminated and grounded as shown in the applicable airplane routing chart. All connectors and terminals in the affected airplane system and HF system should be checked to make sure that they are free of any corrosion and checked for proper pin and terminal nut tension.

(4) If the airplane is still experiencing excessive indicator fluctuations while transmitting on the HF after checking the above referenced items, it may be necessary to relocate/separate the HF system wiring from the affected airplane system wire routing throughout the airplane. It is advisable to keep the affected airplane system wiring isolated as much as possible from any coaxial cable carrying transmitting power (i.e. HF Comm, VHF Comm, Transponder, DME, etc.). As this can require extensive removal of interior furnishings to gain access to the wire bundles, it may be best to save this step until the airplane is in for a major inspection.

HF COMMUNICATION SYSTEM (KING KHF950) - ADJUSTMENT/TEST

1. HF communications system

A. Functionally test the HF system

Equipment/Materials	Part/Item No.
Headset	-

WARNING: DUE TO THE HIGH ENERGY RF OUTPUT GENERATED BY THE HF TRANSMITTER, PERSONNEL MUST BE KEPT CLEAR OF THE HF ANTENNA AND ASSOCIATED EQUIPMENT, WHEN TRANSMISSIONS ARE IN PROGRESS.

CAUTION: MAKE CERTAIN THAT ANY ANTENNA GROUNDING DEVICES HAVE BEEN REMOVED BEFORE OPERATING THE HF RECEIVER.

NOTE: Transmission/reception checks must be made with the aircraft clear of any buildings and obstructions likely to cause interference with communications.

NOTE: This test requires operation of the audio integrating system (Chapter 23).

NOTE: This tests is for No.1 HF system and must be repeated for No.2 HF system, if installed.

Preliminary procedure

(1) Energize the aircraft a.c. and d.c. busbars (Chapter 24, GENERAL).

(2) On the roof panel CG, set the LTS MASTER push switch to ON. Operate the AVIONICS dimmer control and make sure the HF control unit(s) integral lighting responds; adjust the lighting to a suitable viewing level.

(3) Adjust the AVIONICS dimming control for a suitable level of lighting brightness on the audio selector panels (ASP).

(4) Connect a headset to the HEADSET jack socket on the LH side console.

(5) Do the following test set up:

  (a) On the LH ASP, push the HF1 (white) and HF1 (orange) push-switches to on.

  (b) Set the HF1 (white), S/T and VOL rotary controls to their mid-position.

  (c) Set the SPK push-switch to on.

Procedure

ACTION	RESULT
(6) On the HF No.1 control unit do the following: • Select the LH inner concentric VOL control clockwise to the on position. • Set the LH outer concentric SQ control fully clockwise. • Select the RH outer concentric control to AM.	-
NOTE: Allow a three minutes warming up period for the system to stabilize. The control unit display is blanked and transmission is prevented until the crystal oven is up to working temperature and the synthesizer is locked.	
(7) At the HF No.1 control unit setup the frequency of a locally approved AM test channel in the following sequence: • Make sure the display channel (CH) position is showing a flashing zero, or is blank. If a channel number other than zero is showing, push the inner concentric frequency/ channel(cursor/tuner) control switch until a channel digit flashes. Rotate the frequency/channel control in a left or right hand direction to set the channel number to zero and enter the direct tune mode. • Alternately push and release the frequency/channel control to position the cursor (flash the digit) at the frequency digit to be changed (channel number is now blank). Rotate the frequency/channel control in a left or right hand direction to increment or decrement the selected digit. • Do the paragraph above as necessary until the frequency of the locally approved AM test channel is set ...	Local station test channel frequency now shows on control unit
(8) At the HF No.1 control unit, set the VOL control to mid-position.	-
(9) Monitor the local test channel to make sure that it is not in use.	-

ACTION	RESULT
(10) At the pilot's control column, momentarily select R/T position on the I/C-OFF-R/T switch to start the antenna coupling tuning cycle	Make sure during the antenna tuning cycle the control unit frequency display blanks and the 'TX' message flashes. Make sure the antenna tuning cycle is a nominal 3 seconds.
NOTE: *A power amplifier/antenna coupler fault is indicated by all the frequency digits flashing on the control unit.*	
(11) Make sure the local ground station channel is still not in use.	Background noise is heard on the headset.
(12) Slowly turn the SQ control on the HF No.1 control unit counter-clockwise until the background noise on the headset just stops.	-
(13) At the LH control column, select the I/C-OFF-R/T switch to R/T and do a test call to the local ground station. Request a signal quality report.	Sidetone is heard on the headset during transmission to local ground station.
(14) At the LH control column, release the I/C-OFF-R/T switch to OFF and acknowledge the ground station's reply. Make sure of the operation of the VOL control on the HF No.1 control unit during the ground station's reply.	Received transmission from the ground station is clear and distortion free. Level of the received transmission is adequately controlled by the VOL control on the control unit. Make sure the squelch 'opens' quickly and 'closes' shortly during the ground station's transmission period. The ground station reports the received transmission is clear and distortion free.
(15) Do paragraphs (7) to (14) inclusive, but select USB on the HF No.1 control unit's mode switch.	As in paragraphs (7) to (14) where appropriate, but make sure the notes following paragraph (15) are applied in the transmit and receive conditions.

ACTION	RESULT
NOTE: The R/T switch position on the control column should be momentarily keyed each time the transmission mode is changed, to enable antenna coupler tuning.	
NOTE: To use the frequency/channel control as a clarifier in the sideband modes, push the control to position the cursor to flash the last digit of the receive frequency and then rotate the control to offset the receive frequency until speech quality is satisfactory. To clear the clarifier operation, push the STO push-switch or reset the frequency.	
(16) Select the HF No.1 control unit mode switch to AM or USB. Push the frequency/channel (cursor/tuner) control and step the cursor to select an unprogrammed channel number (between 1 and 19), and then set an approved duplex test channel as follows: • Step the cursor to the frequency digits and enter an applicable receiver frequency (local ground station TX test frequency). • Push the STO pushbutton. • Enter an applicable transmit frequency (not too far away from the receiver frequency) then push the STO pushbutton. ...	With cursor stepped to frequency digits and an applicable receiver frequency entered, a flashing dash shows adjacent to the channel number on the display showing the control unit has automatically been placed in the program mode. When the receiver frequency has been accepted while pushing the STO pushbutton, the message 'TX' will flash adjacent to the MHz legend and the cursor will move to the MHz digits on the display. When the transmit frequency has been accepted while pushing the STO pushbutton, the message 'TX' and the cursor will blank on the display and the channel dash will become steady.
(17) At the LH control column, momentarily key the R/T switch. ...	The antenna tunes to the transmitter frequency.
(18) At the HF No.1 control unit push the STO pushbutton. ...	The message 'TX' and transmit frequency will be shown on the control unit.

NOTE: When the system is in the channel mode the receiver still monitors the local ground station TX test frequency (the receiver frequency entered in paragraph (16)(a)).

ACTION	RESULT
(19) Make sure the local ground station test channel is not in use.	-
(20) At the LH control column, select the I/C-OFF-RT switch to R/T and make a test call to the local ground station. Request a signal quality report ...	Sidetone is heard on the headset during transmission to the local ground station.
(21) At the LH control column, release the I/C-OFF-R/T switch to OFF and acknowledge the ground station's reply ...	Received transmission from the ground station is clear and distortion free. Make sure the squelch 'opens' quickly at commencement and 'closes' shortly after the ground station's transmission. The ground station reports that received transmission is clear and distortion free.
(22) At the HF No.1 control unit push the STO pushbutton and key the R/T switch on the LH control column simultaneously ...	A 1000Hz tone is transmitted to 'break' the squelch of the local ground station.
(23) Release the STO pushbutton and the R/T switch to OFF.	-
(24) At the HF No.1 control unit, select A3J (TELS) on mode switch ...	The ITU operating channel number (if available) shows adjacent to the KHz legend on the control unit display.
(25) If compatible telephone stations are available, do paragraphs (20) and (21).	-
(26) At the LH ASP, deselect the HF1 (white) and HF 1 (orange) pushbutton ...	HF No.1 system transmit and receive deselected on the LH ASP.
(27) At the HF No.1 control unit select the VOL control counter-clockwise to 'off'. ...	HF No.1 system switched off.
(28) Do paragraphs (3) to (27) inclusive, but substitute the HF2 switches and controls for HF1 on the control unit and the RH ASP, for the LH ASP, on aircraft with dual HF ...	As in paragraphs (3) to (27), but substitute HF No.2 for HF No.1.

Concluding procedure

(29) De-energize the aircraft a.c.and d.c.busbars (Chapter 24, GENERAL).

(30) Remove the headset from the aircraft.

(31) Make sure the working area is clean, and clear of all tools and miscellaneous equipment.

HF NOTCH AERIAL - DESCRIPTION

1. General

The HF notch aerial installation has a notch cut into the leading edge of the aircraft vertical stabilizer, together with an antenna coupler that automatically matches the impedance of the notch to that of the transmission line from the HF transceiver. The notch extends from frame 21 as far as the elevators and, except for the upper end, is insulated from the adjacent structure by glass-fibre inserts which also serve to restore the surface lines of the aircraft.

The antenna coupler is located below the dorsal fairing and is coupled to the notch through a tubular feeder. In operation, after the tuning sequence of the HF transceiver, RF is fed to the notch; then inductive and capacitive circuits within the antenna coupler are automatically adjusted until the notch presents a VSWR of better than 1.3:1 to the transceiver. This results in the entire aircraft skin radiating at the frequency to which the transceiver is tuned. The coupler operates in both transmit and receive modes.

SELCAL - MOTOROLA N1335C - DESCRIPTION AND OPERATION

1. General

The selective calling (SELCAL) system enables a ground station to alert a specific aircraft through the HF communication system. When the aircraft is called by the ground station, an audible warning is heard over the intercom, and a SELCAL PTR or HF1/HF2 annunciator comes on, depending upon whether a single or dual HF system is installed.

The installation has a decoder and an annunciator which incorporates a reset push-switch.

2. Description

The SELCAL system is powered from the 28 volt d.c. busbar PS-2a through a circuit breaker.

The decoder has four thumbwheel select switches, two for each channel, which program the decoder to react to a specific tone code transmitted from the ground station. SELCAL outputs from the HF system are fed to the decoder and when the aircraft code is received the decoder completes the circuitry to the annunciator which comes on. It also sends a signal to the audio circuits which produce an audible warning.

The annunciator has an integral push-switch which operates when the annunciator cap is pressed. This action cancels the annunciation and resets the decoder for subsequent calls. A monitor circuit in the decoder automatically resets the decoder if it is not manually reset within a preset time interval after activation.

The decoder is housed in a 1/4 ATR short case to ARINC 404 specification. It is located on a rack at the rear of the aircraft. The SELCAL PTR or HF1/HF2 annunciator is located on the top LH corner of the RH instrument panel.

3. Operation

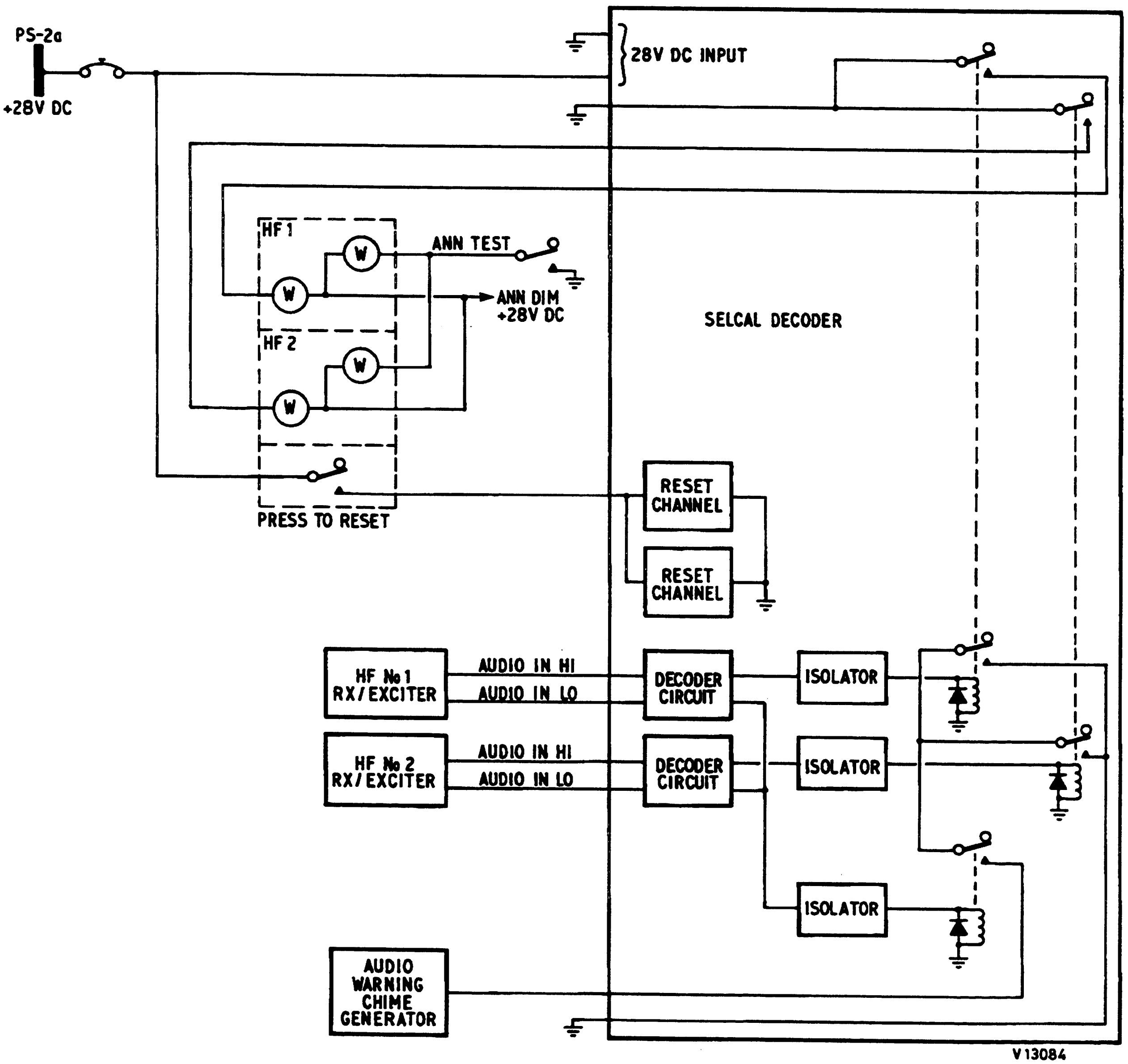
Each transmitted code consists of two consecutive tone pulses of 1 ± 0.25 second duration, separated by an interval of 0.2 ± 0.1 of a second. Each pulse contains two simultaneously transmitted tones. The call consists of one transmitted code without repetition. Each tone code is identified by a letter as follows:

DESIGNATION	FREQUENCY (Hz)	DESIGNATION	FREQUENCY (Hz)
A	312.6	J	716.1
B	346.7	K	794.3
C	384.6	L	881.0
D	426.6	M	977.2
E	473.2	P	1083.9
F	524.8	Q	1202.3
G	582.1	R	1333.5
H	645.7	S	1479.1

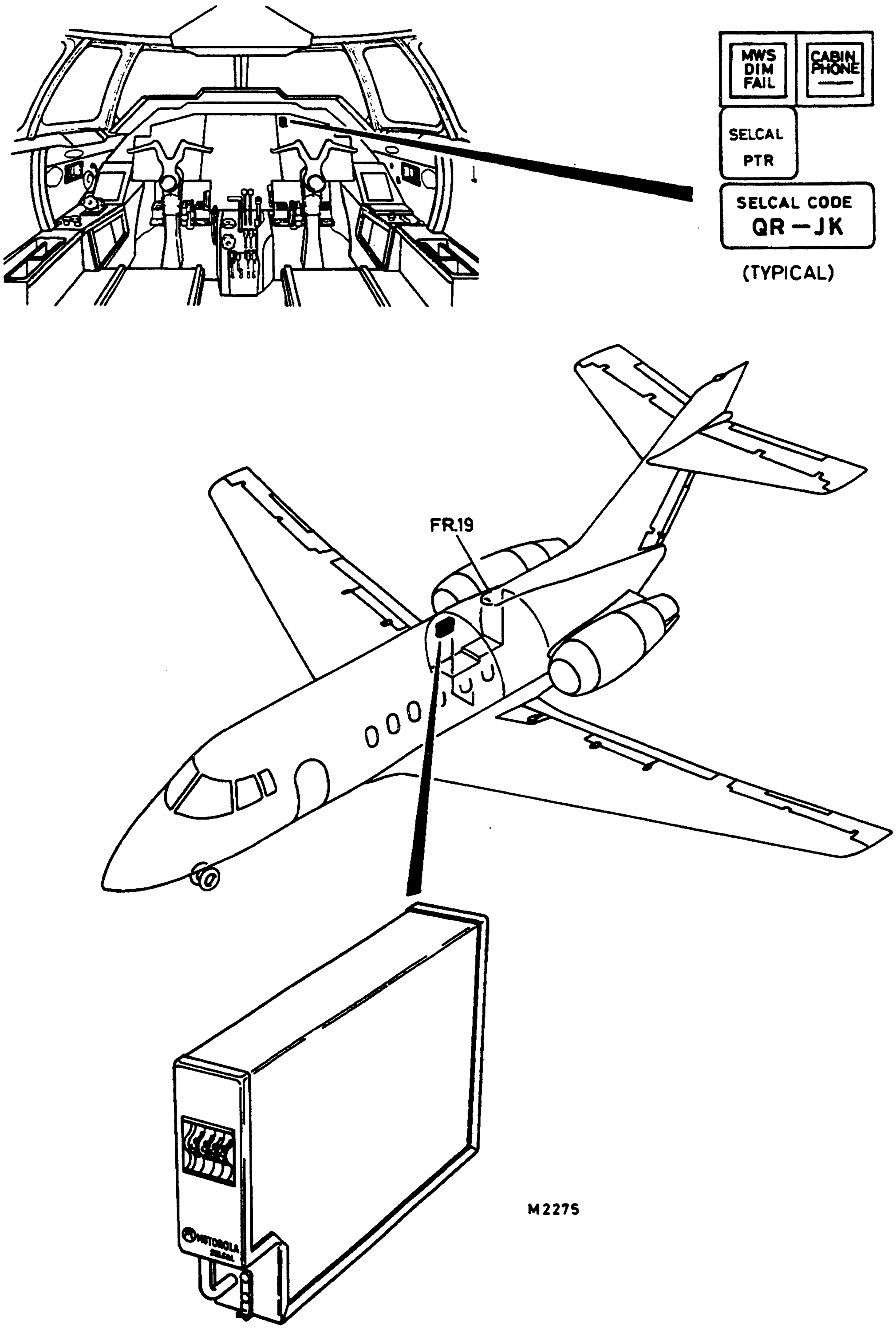
With the 28 volt d.c. busbars energized power is applied to the SELCAL system. The SELCAL PTR or HF1/HF2 annunciator is powered from the flight annunciator dim and test circuit.

When a code matching the programmed code is received on the HF system, the decoder gives an earth return to the SELCAL PTR or HF1/HF2 annunciator which comes on. At the same time the decoder sends a signal to the audio warning chime generator which causes a signal to be heard on the intercom system.

The SELCAL PTR or HF1/HF2 annunciation can be cancelled and reset by pushing the cap of the annunciator. If this is not done within a given period after the call, a monitoring circuit within the decoder automatically cancels and resets the annunciation.



Selcal block diagram (dual system shown)
Figure 1



Component location
Figure 2

SELCAL - MOTOROLA N1335C - ADJUSTMENT/TEST

1. SELCAL system

A. Functional test of the SELCAL system

Equipment/Materials	Part/Item No.
Headset	-

Preliminary procedure

(1) Energize the aircraft busbars (Chapter 24, GENERAL)

(2) At the flight deck roof panel CG, set the LTS MASTER push switch to the on position. The ON caption of the LTS MASTER switch comes on.

(3) On the centre console, adjust the AVIONICS dimmer control for a suitable level of brightness on the captain's audio selector panel (ASP) integral lighting.

(4) On the LH ASP select HF1 radio facility (Chapter 23, AUDIO INTEGRATING SYSTEM).

(5) Connect a headset to the captain's (LH) HEADSET jack-socket.

Procedure

ACTION		RESULT
(6) Tune the HF1 to the frequency of a local station with SELCAL available (Chapter 23, HF SYSTEM).		-
(7) Monitor the selected ground station and make sure it is not in use	...	No transmissions can be heard from the ground station.
(8) Call the selected ground station and request a SELCAL check	...	SELCAL PTR or HF1/HF2 annunciator comes on and audible warning is heard.
(9) Push the SELCAL PTR or HF1/HF2 annunciator	...	The HF1 annunciator goes off and the audible warning ceases.
(10) On the captain's (LH) ASP cancel HF1.		-
(11) On HF controller, switch off HF1.		-
(12) Do paragraphs (4) to (11) inclusive for HF2, if installed	...	As for paragraphs (4) to (11) inclusive, for HF2, if installed, and using captain's (RH) ASP.

Concluding procedure

(13) De-energize aircraft a.c. and d.c. busbars.

(14) Disconnect and remove headset from the aircraft.

(15) Make sure the working area is clean, and clear of tools and miscellaneous equipment.

VHF COMMUNICATION SYSTEM (COLLINS VHF-422A) - DESCRIPTION AND OPERATION

1. General

The VHF communications (VHF COMM) is a dual installation giving two-way communication in the frequency range 118.000 MHz to 135.975 MHz in 25 kHz increments.

Each installation, identified as VHF COMM No.1 and VHF COMM No.2, has a transceiver and an antenna. Control of the system is by means of two radio tuning units (RTU) (Chapter 23, RADIO TUNING UNIT). The VHF COMM transceivers can also be tuned through the flight management system (FMS) (Chapter 34, FLIGHT MANAGEMENT SYSTEM).

Both VHF transceivers are completely solid-state microprocessor-controlled, using a single crystal-controlled digital frequency synthesizer to supply internal radio frequency (RF) signals.

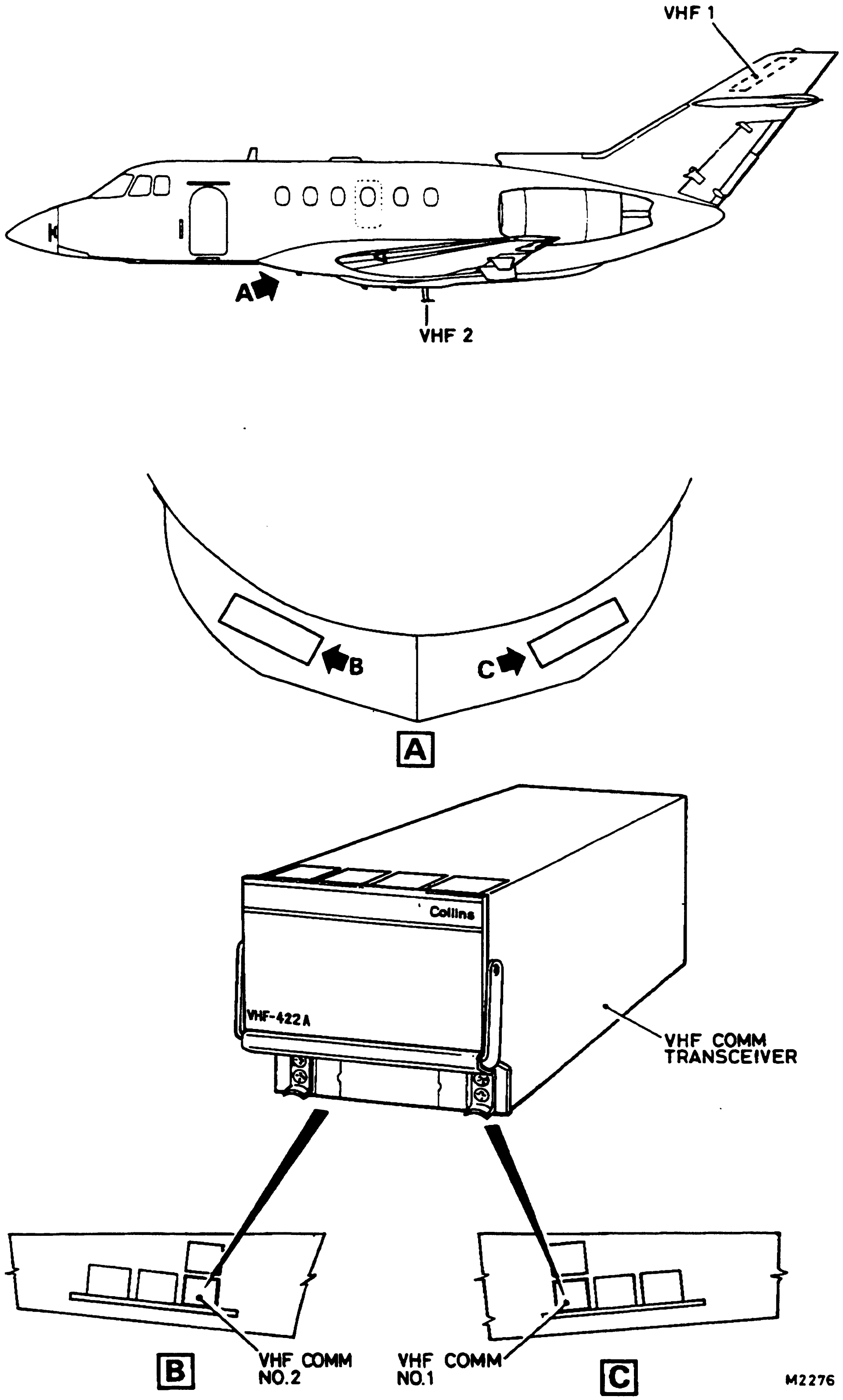
Audio and keying facilities are provided through the audio integrating system (Chapter 23, AUDIO INTEGRATING SYSTEM).

2. Description

Two RTUs, installed in the centre instrument panel, provide all the controls necessary to operate the VHF COMM system. When an RTU is powered up by pushing the RTU 1 ON or RTU 2 ON annunciator switch on the centre instrument panel, the main menu page shows, enabling the frequency of the VHF COMM to be changed by moving the 'selector star' to the COM 1 (or 2) line, and rotating the frequency select controls. Complete control of the system is effective when the COM mode page is selected.

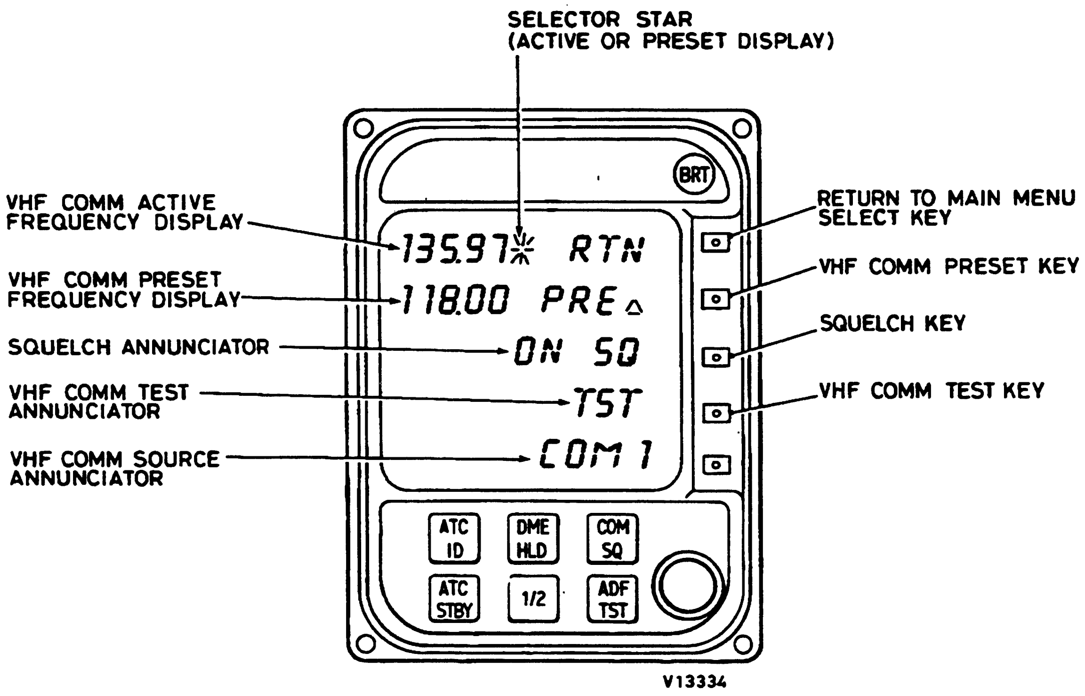
Press the COM line key to place the selector star on the COM line. Press the COM line key again to show the COM mode page. The controls and displays for the COM mode are as follows:

• COM active frequency display	This display shows the VHF COMM radio frequency selected.
• COM preset frequency display	This display shows the preset VHF COMM radio frequency selected.
• COM source annunciator	Shows which VHF COMM system (1 or 2) is being tuned by the RTU.
• Selector star	Shows which VHF COMM frequency can be changed by the frequency select controls.
• Return to main menu select key	Push the RTN key to move the selector star to the active frequency display. Push the RTN key again to return to the RTU main menu page.
• COM preset key	Push the PRE key to move the selector star to the preset frequency line. An upward pointing triangle shows to the right of the PRE legend. Push the key again to interchange the preset and active frequencies. The VHF COMM tunes to the new active frequency and the previous active frequency becomes the new preset frequency.
• Squelch key and annunciator	Push the SQ key to enable (ON SQ) or prevent operation of (OFF SQ), the system squelch circuits.



VHF COMM - Component location
Figure 1

• COM test key	Push the TST key to start a VHF COMM system self-test. An annunciator ON TST shows. When the key is released the ON legend disappears and the test mode stops.
• 1/2 switch	Normally each RTU controls and shows only the on-side systems i.e. RTU No.1 controls system No.1. Push and hold the 1/2 switch to show the cross-side frequencies. When the offside RTU is switched off (e.g. because of failure) the 1/2 switch enables the remaining RTU to control both systems.
• COM squelch switch	Labelled COM SQ, when pushed, this switch stops operation of the VHF COMM receiver squelch circuits. When the switch is released the squelch circuits return to normal.
• Frequency/select controls	These are two concentric rotary controls at the bottom RH corner of the RTU. They are used to change the frequency shown on the starred display line. The larger control changes the most significant digits and the smaller control the two least significant digits of the display.


SELECTOR STAR
(ACTIVE OR PRESET DISPLAY)
VHF COMM ACTIVE FREQUENCY DISPLAY
VHF COMM PRESET FREQUENCY DISPLAY
SQUELCH ANNUNCIATOR
VHF COMM TEST ANNUNCIATOR
VHF COMM SOURCE ANNUNCIATOR
BRT
135.97
RTN
118.00
PRE
ON SQ
TST
COM 1
RETURN TO MAIN MENU SELECT KEY
VHF COMM PRESET KEY
SQUELCH KEY
VHF COMM TEST KEY
ATC ID
DME HLD
COM SQ
ATC STBY
1/2
ADF TST
V13334

RTU - VHF COMM mode page
Figure 2

VHF COMM No.1 antenna is an integral part of the vertical stabilizer. VHF COMM No.2 antenna is a blade type antenna and is installed on the underside of the aircraft fuselage.

The transceiver is contained in a 3/8 ATR, short, dwarf case. It has a connector at the rear to interface with the antenna audio integrating system, RTU and aircraft power supplies.

3. Operation

With the busbars energized, power is supplied to the RTUs by the RTU 1 and RTU 2 annunciator switches, and to the VHF COMM No.1 and VHF COMM No.2 systems. The audio integrating system is also operational but must be selected for VHF operation to enable the VHF conversations to be heard.

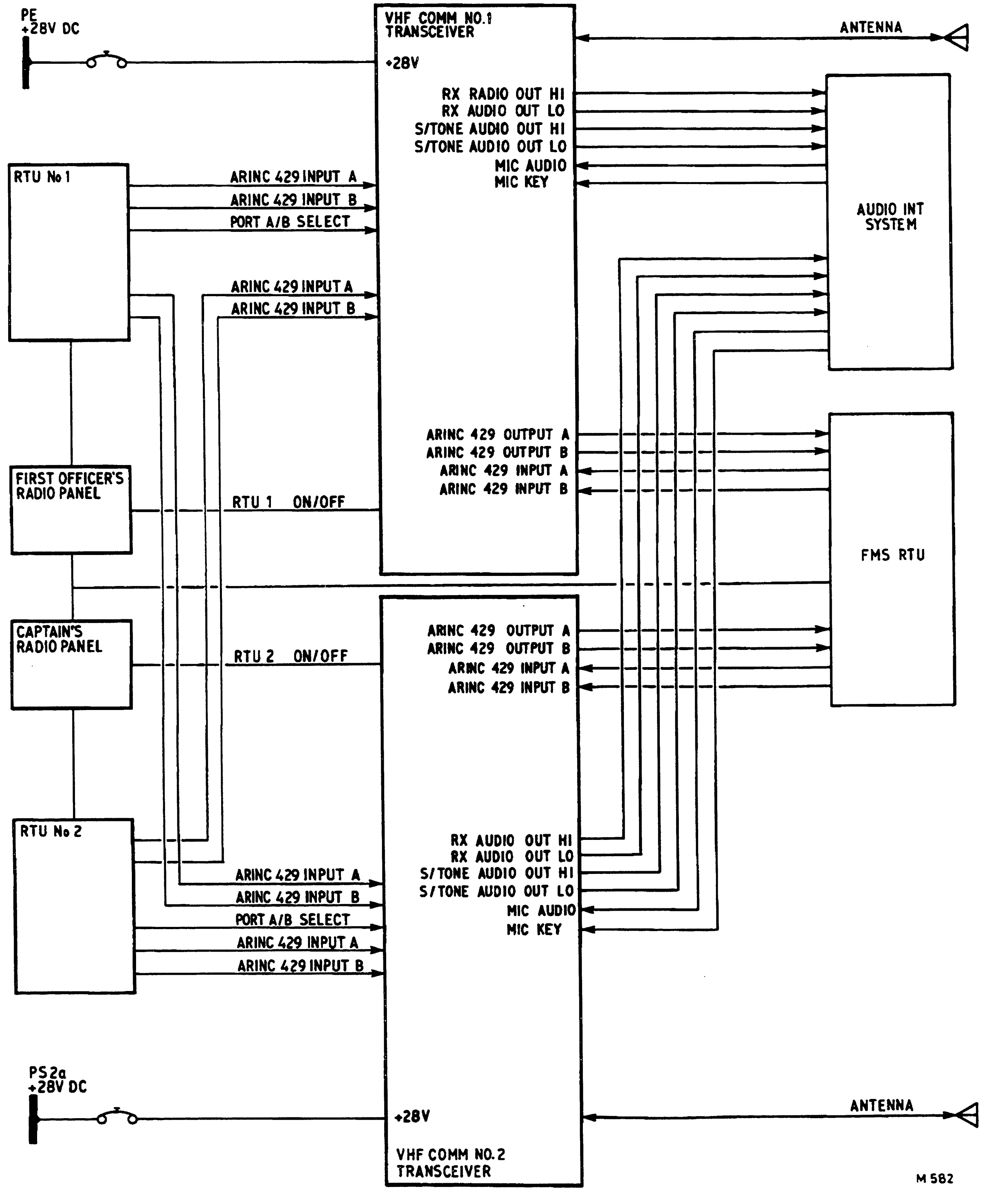
When the transceiver is first powered up, the microprocessor checks its own memory and for a brief period a tone is heard. The RTU shows the same active and preset frequencies which were in use when the power was switched off.

The transceiver is automatically tuned to the active frequency selected on the related RTU. Operation of the control column-mounted R/T switch to the MIC position causes the transceiver to go into the transmit mode.

The microprocessor limits transmission time to approximately two minutes; however should a longer transmission be necessary the R/T switch may be released and pushed again every minute or so to reset the timer.

The microprocessor constantly performs checks on the transceiver. If a fault occurs two short 800Hz beeps are heard to warn of a fault in the system.

A completely separate VHF COMM No.3 system (Chapter 23, BECKER AR 3201 VHF COMMUNICATION SYSTEM) is an optional installation. Each system is interconnected to the others such that the receivers of the non-transmitting systems are de-sensitized during the period of transmission so stopping any damage to the receiver RF input circuits.



VHF COMM - block diagram

Figure 3

VHF COMMUNICATION SYSTEM (COLLINS VHF-422A) - ADJUSTMENT/TEST

1. Operational test

A. Functionally test VHF COMM system

Equipment/Materials	Part/Item No.
Headset	-

Preliminary procedure

(1) Energize the aircraft a.c. and d.c. busbars (Chapter 24, GENERAL).

(2) Set the audio integrating system to produce VHF COMM audio (Chapter 23, AUDIO INTEGRATING SYSTEM).

Procedure

ACTION		RESULT
(3) On centre instrument panel, press RTU 1 annunciator switch to on. Set RTU1 to show the VHF COMM mode page (Chapter 23, RADIO TUNING UNIT)	...	RTU 1 annunciator ON caption comes on. VHF COMM mode page shows.
(4) Place the selector star on the PRE line display and set in a local test frequency	...	PRE line display shows local test frequency.
(5) Press the RTN key	...	Selector star moves to the active frequency display.
(6) Set in a different local test frequency	...	Active frequency display shows new local test frequency.
(7) Press the VHF COMM test key	...	The test line shows the ON TST annunciation.
(8) Press the VHF COMM test key	...	The test line shows the TST annunciation.
(9) Press the squelch key	...	The squelch line shows OFF SQ.
(10) Connect a headset to the captain's (LH) headset socket	...	Receiver squelch is prevented from operating, and receiver background noise can be heard.
(11) Press the squelch key	...	The squelch line shows ON SQ and receiver background noise can no longer be heard in the headset.

ACTION	RESULT
(12) Monitor the local test channel to make sure that it is not in use. On the captain's (LH) control column, press and hold the I/C-OFF-R/T switch to R/T and do a test transmission to the local ground station ...	Transmitter sidetone is audible in the headset (adjust the captain's ASP S/T control as necessary).
(13) Release the I/C-OFF-R/T switch ...	Verify that the strength and clarity of the received transmission is acceptable to the ground station. Check acknowledgement and quality of received return call. Adjust volume level as necessary using COMM control on external volume control unit.
(14) Repeat paragraphs (10) to (13) inclusive for the First Officer's and third crew member's positions, and using RH control column IC-OFF-RT switch ...	As for paragraphs (10) to (13) inclusive.
(15) On the RTU1 press the VHF COMM preset key ...	The active and pre-tuned frequency displays are interchanged.
(16) Repeat paragraphs (12) and (13) for this new frequency ...	As for paragraphs (12) and (13).
(17) Repeat paragraphs (3) to (16) inclusive for RTU2.	-
(18) On RTU1, press the 1/2 key, to transfer control of COM2 to RTU1, and repeat paragraph (15) ...	On RTU1, COM source annunciator shows COM2. COM2 active and preset frequencies can be interchanged by RTU1.
(19) On RTU1, again press the 1/2 key, to relinquish RTU1 control of COM2 ...	On RTU1, COM source annunciator shows COM1.
(20) On RTU2, press the 1/2 key, to transfer control of COM1 to RTU2, and repeat paragraph (15) ...	On RTU2, COM source annunciator shows COM1. COM1 active and preset frequencies can be interchanged by RTU2.
(21) On RTU2, again press the 1/2 key, to relinquish RTU2 control of COM1 ...	On RTU2, COM source annunciator shows COM2.
(22) On each FMS CDU, switch on and initialize the system (Chapter 34 FLIGHT MANAGEMENT SYTEM).	-

ACTION	RESULT
(23) Access the CDU radio tuning pages, which should show the same VHF COMM frequencies as RTU1 and RTU2.	-
(24) On each CDU keyboard in turn, input different VHF COMM frequencies ...	New VHF COMM frequencies show on RTUs.
(25) On centre instrument panel, press both FMS TUNE 1 P INHIB and FMS TUNE 2 P INHIB annunciator switches ...	On both switches, INHIB caption comes on.
(26) On each CDU keyboard in turn, attempt to input different VHF COMM frequencies ...	VHF COMM frequencies showing on RTUs stay the same.
(27) On centre instrument panel, press both FMS TUNE 1 P INHIB and FMS TUNE 2 P INHIB annunciator switches ...	On both switches, INHIB caption goes off.

Concluding procedure

(28) On centre instrument panel, press RTU 1 and RTU 2 annunciator switches to off (ON caption goes off).

(29) On ASPs, deselect all systems.

(30) Disconnect and remove headset.

(31) On FMS CDUs, press the ON/OFF-DIM key, then press the line select key adjacent to the OFF prompt to de-energize the FMS.

(32) De-energize the aircraft a.c. and d.c. busbars.

(33) Make sure that the working area is clean, and clear of all tools and miscellaneous equipment.

VHF-1 COMMUNICATION AERIAL - DESCRIPTION

1. General

The VHF communication aerial is formed by the upper vertical stabilizer. The design is such that the relative masses, shapes and disposition of the metallic and non-metallic components behave, at radio frequencies, like a sleeved unipole aerial with top loading. They also form the major portion of the required matching stub.

COMMUNICATIONS - COLLINS INSTALLATION
COMMUNICATIONS
AERIAL - VHF-2
REMOVAL/INSTALLATION

1. INFORMATION

Equipment/Materials	Part/Item No.
Polysulfide sealant	313 (Chapter 20-95-301)
Cleaner, solvent	201 (Chapter 20-95-201)
Aluminum wool	Local supply

2. REMOVAL

A. Procedure

	MECH	INSP
(1) Open, safety clip and tag, the related circuit breaker (Ref. 24-01-00, 201): **Panel** **Label** DA-A VHF COMM 2		
(2) Remove and hold the the keel skid fairing from the airplane (Ref. 53-50-15, 401).		
(3) Hold the aerial and disconnect the coaxial cable plug.		
(4) Remove the sealant and remove the aerial attachmnent bolts and stiffnuts.		
(5) Remove the aerial and install dust caps to the coaxial cable plug and the aerial socket.		

3. INSTALLATION

A. Procedure

	MECH	INSP
(1) Clean the related area of the keel fairing and the base of the aerial with cleaner solvent (Item 201) and aluminum wool (Ref. AMM 125/H-20, 20-10-5016, 201 paragraph 3.).		
(2) Remove the dust caps from the plug and socket.		
(3) Hold the aerial close to the keel fairing and connect the coaxial cable plug to the aerial socket.		
(4) Put the aerial in position and install with the attachment bolts and stiffnuts.		
(5) Seal the edge of the aerial the top of the bolts and cover the stiffnuts with sealant (Item 313) (Ref. AMM 125/H20, 20-10-5016, 201, paragraph 4.A. (2)).		

	MECH	INSP
(6) Carefully install the keel skid faring (Ref. 53-50-15, 401).		
(7) Remove the safety clip and tag, and close the circuit breaker opened in paragraph 2.A. (1) (Ref. 24-01-00, 201).		
(8) Do a functional test of the VHF-2 system (Ref. 23-20-79, 501).		

B. Close Up

(1) Make sure that the work area is clean and clear of tools and other equipment.

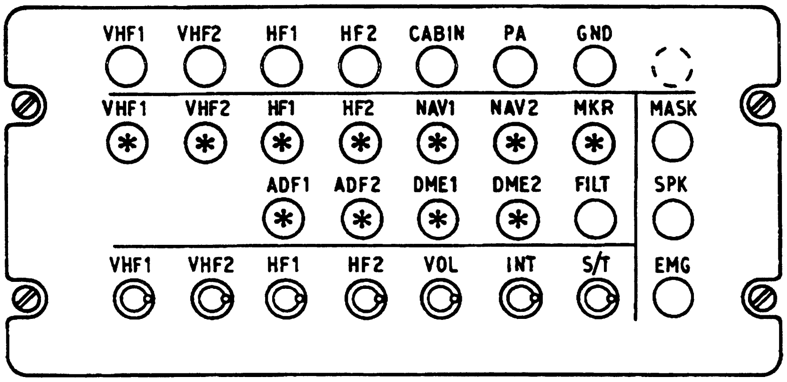
BAKER M1045 AUDIO INTEGRATING SYSTEM - DESCRIPTION AND OPERATION

1. General

The Baker M1045 audio integrating system provides for the selection and distribution of radio and navigation audio signals, together with intercommunication facilities between flight crew members, and between flight crew members and ground crew. The system also includes passenger address facilities (PA).

The system has up to three audio select panels (ASP), up to three external volume control panels, a power amplifier/chimes unit and a number of ground crew and/or steward's jack boxes. A separate interphone amplifier is used to provide cabin telephone facilities (when installed). A separate chime generator gives a number of different tones and chimes to alert the flight crew to certain pre-selected events.

2. Audio select panel



*- INDICATES ORANGE BUTTONS

Basic audio select panel layout
Figure1

M543

Each ASP has a number of alternate action (push-on/push-off) push-button switches and related switching circuits for selection of radio/navigation and intercom audio signals. The gain of selected audio signals is controlled automatically to maintain a constant output level.

The overall level of received signals is adjusted by a rotary control marked VOL. Individual controls are provided for VHF1 and 2, HF1 and 2, INTercom and Side Tone (S/T) levels; all other audio signal level adjustments are made from external volume control units (paragraph 3).

A number of white system-select push-button switches, enclosed by engraved lines (*Figure1*) are used to select the required audio services and route the signals to the headset or loudspeaker (as selected). These outputs may be mixed as required, the buttons are not interlocked. The green FILTer switch, when pushed, inserts a 1020 Hz filter into the NAV and ADF audio circuits to reduce the level of the identification tone.

The orange microphone system-select buttons are mechanically interlocked, allowing only one service to be selected at a time. Pushing a button routes both microphone and telephone (MIC/TEL) signals to the related headset/ loudspeaker. The CABIN button, when pushed, enables a flight crew member to talk with a passenger by way of the cabin telephone (paragraph 7). A passenger address facility is used by pushing the PA button.

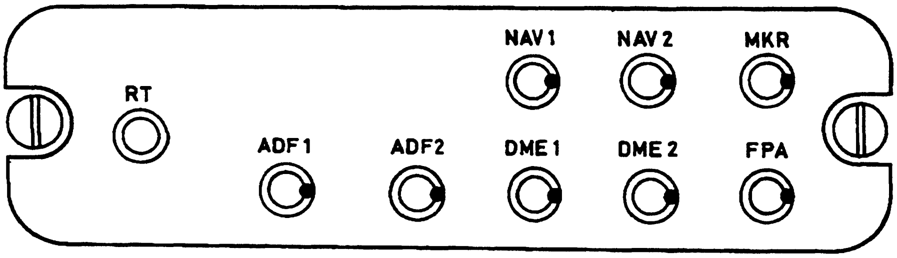
NOTE: Selecting PA on an ASP isolates the passenger entertainment system output to the loudspeakers and headphones and, regardless of the entertainment system switch/volume control settings, enables microphone announcements from the flight deck.

With the GND button pushed, intercom is available to the ground crew jack box(es) (paragraph 8).

If there is an amplifier failure or complete loss of power to the audio system, pushing the red EMG button enables emergency operation to continue, using headset and hand microphone. Under normal conditions an related loudspeaker, of which there are two installed in the flight compartment roof, can be switched on by pushing the green SPK button, thus removing the need for continual use of the headsets. The red MASK switch selects the oxygen mask microphone when pushed; in the out position, the headset boom microphone is selected. A hand microphone can be used by pushing its press to talk (PTT) switch, regardless of the setting of the MASK switch.

3. External volume control unit

Up to three external identical volume control units control the volume levels of navigation and radio audio signals. A green RT momentary action button duplicates the transmitter keying function of the MIC position on the control column-mounted INTER-off-MIC switch.



External volume control unit
Figure 2

4. Other switches

Installed on each control column handwheel is a 3-position switch with a centre off position. Pushing the switch forward against the spring pressure (MIC position) keys a selected radio transmitter; pulling the switch back into the INTER position enables intercom between flight crew members.

A headset socket and PTT switch for the third crew member is on the Captain's bulkhead. When a third ASP is not installed, an additional interphone amplifier (Baker M1052) is installed for the third crew member's headset signals.

An auxiliary output from each ASP provides an audio signal to the cockpit voice recorder (when installed).

5. Power amplifier/chimes unit

The M1050 power amplifier/chimes unit contains the switching circuits for the control, amplification and distribution of the interphone, transmitter, receiver and passenger address audio signals as selected by the ASPs. Additional amplification is provided in this unit for entertainment equipment, such as a video system and/or a stereo radio/cassette/CD system, with loudspeaker/headphones selection logic as required. Optional facilities provided include a 14 volt power supply, driven from the aircraft d.c. busbars, to give power for a stereo radio/cassette/CD system (paragraph 9), or an additional audio input channel.

A selection of chime outputs are available as interrupts to the entertainment audio, and are as listed in *Table 1*.

Chime outputs
Table 1

Function	Input enable	"On" chime	"Off" chime
"Fasten seat belts" sign	+28 volts	2-tone	1-tone (high)
"No smoking" sign	+28 volts	2-tone	1-tone (high)
Oxygen sign	+28 volts	2-tone	1-tone (high)
Lavatory HELP signal	+28 volts	1-tone (high)	None
Passenger address	Gnd	2-tone	None
Passenger briefing	Gnd	2-tone	None

A latching annunciator lamp drive circuit with a ground input enable is also available.

NOTE: For details of installations, refer to the relevant topic in Chapter 23, Table of Contents.

6. Chime generator unit

The M1285AC chime generator is a remotely installed unit giving up to twelve different warning signals to alert the flight crew of pre-selected events. Each of the signals may be enabled by the application of either 28 volts d.c. or a ground to the related plug pin.

Chimes/tones available are listed in *Table 2*.

Available chimes/tones
Table 2

Chime/tone	Typical function
1-tone chime (high)	TKS antice warn
1-tone chime (low)	Cabin call
2-tone chime (high-low)	SELCAL
Repeat chime (high)	-

Available chimes/tones
Table 2 (Continued)

Chime/tone	Typical function
2-tone triple chime (high-low-high)	-
Continuous tone (low)	-
Alternate tones (high-low-high-low...)	-
Warble	-
Cavalry charge	AP disconnect
90 Hz buzzer	FMS waypoint alert
"C" chord	ALT alert
Clacker	-

NOTE: Not all facilities are used; for details of installations, see Chapter 23, Table of Contents.

7. Interphone amplifier

The Baker M1042 interphone amplifier is a four or five channel audio unit that, in combination with the ASPs and a telephone handset (*Figure 3*) installed in the passenger compartment, gives two-way voice communication between the flight crew and passengers. The cabin handset may also be connected directly to the aircraft HF transceiver to give the user an air-to-ground telephone link that may be patched into the ground-based telephone networks.

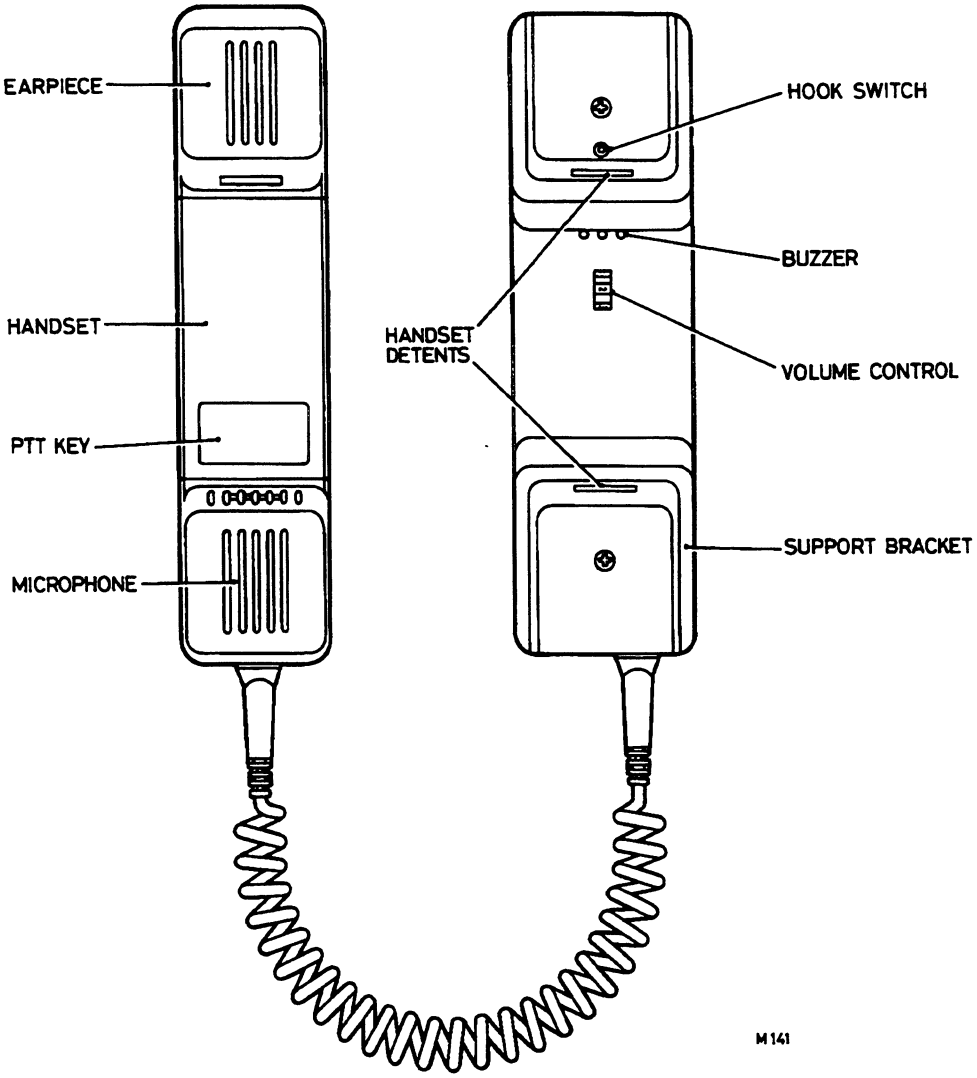
Figure 3 shows the standard cabin phone module that is normally on the side-wall panel adjacent to the VIP seat.

The cabin telephone does not have user controls other than an integral tels volume control, and PTT switch for use when switched to the HF system.

To call from the flight deck to the cabin, the CABIN PHONE CALL annunciator switch on the pedestal is momentarily pushed to sound a buzzer in the telephone cradle. Communication is established when the Captain/First Officer selects CABIN on a station box, and the passenger lifts the handset from the cradle; this operates the hook switch, which causes a cabin call LO chime to sound over the audio system, and illuminates the ON caption in the CABIN PHONE CALL switch and the CABIN PHONE caption on an annunciator on the right hand instrument panel.

To call from cabin to flight deck, the passenger lifts the handset from the cradle, which sounds the chime and illuminates the annunciator captions as just described; the Captain or First Officer selects CABIN on a station box to establish communication. If required, the cabin telephone may now be connected to the HF system by pushing the CABIN PHONE HF switch; this illuminates the ON caption and changes over the HF PTT key and mic/tels lines from the flight deck to the cabin 'phone. In this condition, the cabin telephone is connected to the HF radio service and, in combination with the handset PTT switch, enables two-way communication with ground stations. Volume level of received signals in the telephone handset can be controlled by the handset integral volume control.

On some installations, a UHF radio telephone system is installed in place of the cabin phone. This is covered in a separate topic, see Chapter 23, Table of Contents.



Cabin phone handset
Figure 3

8. Ground crew jack box

The ground crew jack box permits intercommunication between ground and flight crew members. It contains a jack socket for connection of a headset; a spring-loaded flap protects the socket when not in use. It is brought into service by pressing the GND button on an ASP. On some installations, an additional box is fitted in the rear equipment bay.

9. Passenger entertainment system

Audio outputs from a stereo radio/cassette/CD system and/or a video system are fed by way of the audio integrating system to the cabin loudspeakers. A number of different types of passenger entertainment system may be installed, depending on customer requirements, refer to Chapter 23 - Table of Contents.

10. Power supplies

Electrical power to the audio integrating system is supplied from the d.c. busbars. If normal supply is interrupted, selecting EMG on the station box routes No.1 battery output to the system. Intercom facilities are now available by way of the headsets and hand microphone.

BAKER M1045 AUDIO INTEGRATING SYSTEM ADJUSTMENT/TEST

1. Functionally test audio integrating system

Equipment/Materials	Part/Item No.
Headset	-
Hand microphone	-
Oxygen mask	-
Handset	-
DME test set	-
NAV 402 AP test set	-

NOTE: If, during the test procedure, breakthrough from other radio sources is experienced, this may be due to an abnormally high output setting on that radio system rather than a fault on the audio system. Refer to the vendor maintenance manual for the radio system for adjustment instructions.

A. Preliminary procedure

(1) Energize the a.c.and d.c. busbars (Chapter 24, GENERAL) and switch on all the radio equipment giving audio inputs to the audio integrating system (Chapter 23, COMMUNICATIONS and Chapter 34, AVIONICS). Set the radio equipment tuning to local frequencies, where this is not possible, set up the necessary test equipment as described in the applicable radio MAINTENANCE PRACTICES.

(2) Connect all the telephone and microphone equipment provided (headsets, hand microphone, oxygen masks and handsets) to the applicable jack sockets, and make sure the MASK switch is in the correct position.

(3) Do the following set up:

(a) On the audio select panels (ASP), set the VOL and S/T controls to the mid position, push the SPK button to on, select EMG, FILT and all the selector buttons to off.

(b) On the external volume control units, set all the controls to the mid position.

(c) On the control columns and at the third crew position, make sure the INTER-off-MIC switch is selected to off.

(4) On the flight deck roof panel CG, set LTS MASTER push switch to ON. On the centre console lower left hand, operate the AVIONICS dimmer control over its full range. Make sure the integral panel lighting on the ASPs and volume control panels responds in the correct sense to the dimmer control movement. Leave the control set to a suitable viewing level.

(5) On the centre console, lower left hand, operate the DIGITS dimmer control to set the radio tuning units and tune head digital displays to a suitable viewing level.

B. Procedure

NOTE: *It is required that subsequent operations are done using all telephone and microphone equipment at each selected ASP in turn, and using No.1 and 2 services in turn.*

Action		Result
(1) On the ASP, select each receiver service in turn to on, then off. If necessary, adjust the volume at the related external volume control unit to provide a satisfactory level for each service (adjust the HF receiver volume at the HF tune head)	...	For each service, the receiver background noise is audible over the flight compartment loudspeakers, and, with the SPK button released, in the headset telephones.
(2) On the ASP, keep one receiver service selected, then operate the VOL control over its full range	...	The receiver background noise follows the sense of the VOL control.
Intercom (normal supplies)		
(3) Set the ASP INT volume control to its mid position. Select any radio transmitting service	...	The Intercom service between flight crew positions is selected.
(4) Select the control column INTER-off-MIC switch to INTER, do a two or three-way intercom check with an assistant at the other ASP(s), and check the operation of the INT volume control. Whilst testing use all the available telephone and microphone equipment to test their serviceability	...	The intercom service between the flight crew positions are to be fully operational. The INT volume control to be smooth in operation and noise free.
(5) On the ASP select GND, do a two or three-way intercom check with an assistant at the ground crew position(s). After the check de-select GND	...	The intercom service between the ground crew position to be fully operational.

Action	Result
ADF system	
(6) On the ASP select ADF receiver service tune both RTUs to a local ground station transmitting in the ADF frequency band. Adjust the volume control(s) for a suitable listening level ...	The ADF system audio or ident signal received are of adequate volume, clear and free of distortion.
(7) On the ASP de-select the ADF receiver service.	-
Navigation and DME systems	
(8) Position the NAV 402 AP and DME test sets adjacent to the aircraft. Switch on and set a VOR signal to117.9MHz with ident, as detailed in the manufacturer's instructions.	-
(9) Tune both RTUs to a test set frequency of 117.9MHz.	-
(10) On the ASP, select NAV service adjust the volume control as necessary ...	The 1020Hz identification tone is heard when NAV service is selected.
(11) On the ASP select FILT ...	The 1020Hz identification tone is reduced in volume when FILT is selected.
(12) On the ASP de-select FILT ...	The 1020Hz identification tone is restored to its original volume when NAV service is selected.
(13) On the NAV 402 AP test set, select the radial corresponding to the aircraft heading. Select TO. ...	-
(14) On the DME test set, select '205 miles TO' range. ...	-
(15) On the ASP, select NAV and DME, services; on the DME test set, push IDENT ...	The 1020Hz identification tone is heard when IDENT is pushed. The tone can be controlled by the FILT button and DME volume control.
(16) On the ASP, de-select DME; switch off the DME test set.	-

Action	Result

Marker receiver

NOTE: NAV 1 MKR feeds Captains and third crew ASP. NAV 2 MKR feeds F/O ASP only.

Action	Result
(17) Find the marker aerial on the forward keel between frames 9A and 9B. Position the marker beacon test generator (NAV 402 AP test set) beneath the aerial.	-
(18) Raise the test generator aerial and set the controls to give an output of 20,000 microvolts with 90% modulation at 3000Hz.	-
(19) On the Captains ASP select NAV 1 and MKR.	-
(20) On the F/O ASP select NAV 2 and MKR.	-
(21) On the third crew ASP select NAV 1 and MKR.	-
(22) Select the test generator master switch to on; adjust the external MKR volume controls for a suitable listening level ...	A 3000Hz tone is clearly heard in the headset telephones.
(23) On the test generator, set the controls to produce modulations of 1300 and 400Hz, in turn ...	1300 and 400Hz, tones are clearly heard in the headset telephones.
(24) On the ASP, de-select NAV and MKR.	-
(25) Select all the NAV 402 AP test set switches to off; remove the test set from the aircraft.	-

VHF communications

Action	Result
(26) On the ASP, select VHF transmit and receive pushbuttons; tune both RTUs, to a local test frequency. Adjust the volume control(s) for a suitable listening level whilst monitoring the test channel.	-
(27) Select the INTER-off-MIC switch to MIC and transmit a test call on the selected radio, adjusting S/T as necessary. Release the INTER-off-MIC switch ...	The transmitter is keyed and sidetone is heard. On acknowledgement of the test call, do a check for clarity and note the strength of the transmission.

Action	Result
(28) Do a test call using the R/T button on the external volume control units instead of the INTER-off-MIC switch	As paragraph (27).
(29) On the ASP, de-select the VHF transmit and receive pushbuttons.	-
HF communications	
(30) Do paragraph (26) to (29) inclusive for the HF communication system	As paragraphs (26) to (29).
Passenger address	
(31) Select PA on the ASP. Test the passenger address facilities as follows:	-
(a) Select the INTER-off-MIC switch to the MIC position and speak into the microphone	A 2-tone chime sounds; speech is heard over the cabin and toilet loud-speakers, and headphone positions.
(b) Switch on the passenger entertainment equipment. Do a check operation of all controls such as the SPEAKER MUTE, etc. (Chapter 23, COMMUNICATIONS)	The sound is reproduced on the cabin loudspeakers and headphones to a satisfactory quality similar to the signal source.
(c) Do (a) at each flight crew position in turn, but with the SPEAKER MUTE operated (caption on)	The passenger entertainment audio output is overridden and speech is heard over all the loudspeaker and headphone positions.
(32) On the ASP, de-select the PA button.	-
Telephone - normal operation	
(33) With an assistant in the passenger cabin, do a two-way test on the cabin telephone as follows:	-
(a) At the cabin telephone, lift the handset from the cradle	The cabin call LO chime sounds over the audio system. On the flight deck, the ON caption in the CABIN PHONE CALL annunciator switch on the centre console and the CABIN PHONE caption on the RH instrument panel annunciator comes on.

Action	Result
(b) On the ASP, select the CABIN pushbutton and select the INTER-off-MIC switch to INTER	Communication is established between the cabin and flight deck; speech quality is to be of adequate volume and clarity.
(c) Select the INTER-off-MIC switch to off; replace the telephone handset on the rest. On the ASP, de-select CABIN.	-
HF to phone	
(34) On the flight deck, set up a test call on the HF system as in paragraph (30)	-
(35) On the centre console, momentarily push the CABIN PHONE CALL annunciator switch	On the cabin phone, the buzzer sounds; the assistant lifts the handset. Make sure the CABIN PHONE CALL and CABIN PHONE ON annunciator captions come on.
(36) On the centre console, press the CABIN PHONE HF annunciator switch	The CABIN PHONE HF annunciator switch ON caption comes on.
(37) Do an HF test call from the cabin phone, using the cabin phone PTT switch	The transmitter is keyed and sidetone is heard. On acknowledgement of the test call, check the clarity.
(38) At the end of the test call replace the handset. On the flight deck de-select the CABIN PHONE HF ON annunciator switch. On the ASP de-select the CABIN pushbutton.	-
Safety notices and chime	
(39) On the flight deck roof panel CG, operate the safety notice switch NO SMKG to ON, then to OFF	A 2-tone chime sounds when the switch is set to on; a 1-tone high chime sounds when the switch is set to off.
(40) Do (39) for the SEAT BELTS safety notice	As (39).
Intercom (emergency supplies)	
(41) At the ASPs, de-select all pushbutton switches.	-

Action		Result
(42) At the RTUs, tune heads, and in the cabin, switch off all the navigation, communication and entertainment systems.		-
(43) At the flight deck roof panel CG, set the LTS MASTER pushbutton switch to OFF.		-
(44) De-energize the a.c. and d.c. busbars (Chapter 24, GENERAL)	...	All the power is removed from the aircraft.
(45) On the flight deck roof panel CG, select the BATT switch to the EMERG position	...	PE busbar energized.
(46) On each ASP de-select SPK and select the EMG pushbuttons; select the control column INTER-off-MIC switch to INTER and do a two or three-way intercom check at the other ASP(s)	...	The Intercom service between the flight crew positions to be fully operational on the headsets and hand microphones.
(47) Restore the external power and select the BATT switch to OFF.		-

C. Concluding procedure

(1) Disconnect and remove all the telephone and microphone equipment.

(2) De-energize the a.c. and d.c. busbars.

COMMUNICATIONS
AUDIO INTEGRATING SYSTEM
LOUDSPEAKERS
REMOVAL/INSTALLATION

1. LOUDSPEAKER IN FLIGHT COMPARTMENT

A. Removal

	MECH	INSP
(1) On panel DA-A, open the applicable audio system circuit breaker (Ref. 24-01-00, 201) and (Ref. Chapter 23 COMMUNICATIONS).		
(2) Remove the related roof panel trim assembly as follows: (a) Loosen the two captive fasteners which attach panel CG, and lower panel CG to the length of its retaining cords. (b) Release the Velcro tape at the forward end of the crew services panel, and slide aft until released. (c) Release the now exposed latch bolts and ease out the roof panel trim assembly.		
(3) Remove the four outer panhead bolts that attach the loudspeaker mounting assembly to the airplane structure and withdraw to the length of the connecting leads.		
(4) While supporting the assembly, remove the four inner panhead bolts that attach the loudspeaker to the mounting ring and backplate.		
(5) Disconnect the connecting leads noting polarity, and remove the loudspeaker.		

B. Installation

	MECH	INSP
(1) Connect the loudspeaker leads, making sure the polarity is as previously noted.		
(2) Attach the loudspeaker between the backplate and mounting ring with four panhead bolts.		
(3) Attach the loudspeaker mounting assembly to the airplane structure with four panhead bolts.		

	MECH	INSP
(4) Install the roof trim panel assembly as follows: (a) Put the roof trim panel assembly in position and attach with the two latch bolts. (b) Slide in the crew services panel, make sure that the panel is fully forward and the rear tabs are located on the trim panel. Attach the forward end with Velcro tape. (c) Lift up and install panel CG.		
(5) Close the applicable circuit breakers and do a functional test of the loudspeaker (Ref. Chapter 23, COMMUNICATIONS).		

2. LOUDSPEAKER IN PASSENGER COMPARTMENT FORWARD BULKHEAD

A. Removal

	MECH	INSP
(1) On panel DA-A, open the applicable CABIN PA and CABIN MUSIC circuit breaker, and remove the AUDIO/STEREO fuse in panel ZK. (Ref. 24-01-00, 201) and (Ref. Chapter 23 COMMUNICATIONS).		
(2) Get access to the rear of the bulkhead. Find the velcro tape attached loudspeaker rear cover and remove using the finger hole provided.		
(3) Disconnect the connecting leads, noting polarity.		
(4) Remove the four nuts and washers that attach the loudspeaker to the mounting plate assembly, and remove the loudspeaker.		

B. Installation

	MECH	INSP
(1) Install the loudspeaker to the mounting plate assembly, and attach with the four nuts and washers.		
(2) Connect the loudspeaker leads, making sure the polarity is as previously noted.		
(3) Position the cover over the loudspeaker cavity, and push firmly to attach.		
(4) Close the applicable circuit breakers and do a functional test of the loudspeaker (Ref. Chapter 23, COMMUNICATIONS).		

3. LOUDSPEAKER IN PASSENGER COMPARTMENT

A. Removal

	MECH	INSP
(1) On panel DA-A, open the applicable CABIN PA and CABIN MUSIC circuit breaker, and remove the AUDIO/STEREO fuse in panel ZK. (Ref. 24-01-00, 201) and (Ref. Chapter 23 COMMUNICATIONS).		
(2) Find the loudspeaker to be removed and remove the trim panel (Ref. MMA, 25-20-00, 401).		
(3) Disconnect the connecting leads, noting the polarity.		
(4) Remove the three or four nuts and washers (dependant upon installation) which attach the loudspeaker to the trim panel and remove the loudspeaker.		

B. Installation

	MECH	INSP
(1) Install the loudspeaker to the rear of the trim panel, and attach with the nuts and washers.		
(2) Connect the loudspeaker leads, making sure the polarity is as previously noted.		
(3) Install the trim panel (Ref. MMA, 25-20-00, 401).		
(4) Close the applicable circuit breakers and do a functional test of the loudspeaker (Ref. Chapter 23, COMMUNICATIONS).		

4. LOUDSPEAKER IN TOILET COMPARTMENT

A. Removal

	MECH	INSP
(1) On panel DA-A, open the applicable CABIN PA and CABIN MUSIC circuit breaker, and remove the AUDIO/STEREO fuse in panel ZK. (Ref. 24-01-00, 201) and (Ref. Chapter 23 COMMUNICATIONS).		
(2) Remove the applicable roof trim panel which is attached by Velcro tape.		
(3) Remove the four countersunk bolts that attach the loudspeaker mounting plate to the mounting brackets. Collect the four spacers and rear cover.		
(4) Disconnect the loudspeaker leads, and remove the loudspeaker complete with the mounting plate.		

	MECH	INSP
(5) Remove the three, or four countersunk bolts and stiffnuts (dependant upon installation) which attach the loudspeaker to the mounting plate. Remove the loudspeaker and collect the cork gasket.		

B. Installation

	MECH	INSP
(1) Position the loudspeaker and gasket on the mounting plate and attach with the countersunk bolts and stiffnuts		
(2) Connect the loudspeaker leads.		
(3) Interpose the four spacers between the mounting plate and the rear cover, and attach the assembly to the mounting brackets with the four countersunk bolts.		
(4) Install the trim panel.		
(5) Close the applicable circuit breakers and do a functional test of the loudspeaker (Ref. Chapter 23, COMMUNICATIONS).		

COMMUNICATIONS

STATIC DISCHARGING DESCRIPTION AND OPERATION

1. INFORMATION

(800XP): Refer to Figure 1, Sheet 1.

(800XP with HBC Winglets) Refer to Figure 1, Sheet 2.

Static discharge probes are installed on the wing tips, winglets (if installed) and trailing edges of the wings, tailplane, fin and rudder. One is also installed to the underside of the rear fuselage. Static charges which may develop on the airplane are dissipated via the discharger probes, thus reducing radio noise interference, caused by a corona discharge, to a minimum.

2. DESCRIPTION

(800XP): There are 28 static discharge probes attached to the tips and trailing edges of the wings, horizontal and vertical stabilizers. There are 24 trailing edge types (B, C and D) and 4 tip types (A) (Ref. Table 1).

(800XP with HBC Winglets): There are 28 static discharge probes attached to the winglets and trailing edges of the wings, horizontal and vertical stabilizers. There are 26 trailing edge types (B, C and D) and 2 tip types (A) (Ref. Table 2).

Each discharge probe consists of a number of fine discharge points attached to a high resistance (6 to 120 megohms) element. The element electrically connects the discharge points to the airplane via a discharge probe retainer which is riveted to the airplane skin.

The trailing type discharge probe is installed into a socket in its retainer and is locked in position with a single screw in the discharge probe. Conversely, the tip type discharge probe is installed into a slot in its retainer and is locked in position with a single grub screw in the retainer.

(800XP): The details of the various static discharge probes approved for this airplane are given in Table 1.

Table 1
Approved Static Discharge Probes

Probe Identity (Figure 1, Sheet 1)	Total per Airplane	Chelton Part No.	H.R. Smith Part No. (Old)	H.R. Smith Part No. (New) (refer to Note)	Dayton Granger Part No. (New)
A	4	2-14-SC-1	10-900-21	10-900-21A	740007-1
B	11	2-11-SC-1	10-900-53	10-900-53A-2	17770-1
C	1	2-18-SC-1	10-900-31	10-900-31A-2	17805
D	12	2-11-SC-1	10-900-53	10-900-53A-2	17770-1
NOTE When H.R. Smith static discharge probes are used the new Part No. is the preferred spare.					

(800XP with HBC Winglets): The details of the various static discharge probes approved for this airplane are given in Table 2.

Table 2
Approved Static Discharge Probes

Probe Identity (Figure 1, Sheet 2)	Total per Airplane	Chelton Part No.	H.R. Smith Part No. (Old)	H.R. Smith Part No. (New) (refer to Note)	Dayton Granger Part No. (New)
A	2	2-14-SC-1	10-900-21	10-900-21A	740007-1
B	11	2-11-SC-1	10-900-53	10-900-53A-2	17770-1
C	1	2-18-SC-1	10-900-31	10-900-31A-2	17805
D	14	2-11-SC-1	10-900-53	10-900-53A-2	17770-1
NOTE When H.R. Smith static discharge probes are used the new Part No. is the preferred spare.					

3. OPERATION

The dischargers dissipate static electrical charge in the following three ways:

- By reduction of the voltage level required to initiate corona discharge.
- By causing the discharge to take place at right angles to antenna coupling fields.
- By creating regions of practically zero radio frequency field strength (null-field) and causing the discharge to take place in these regions.

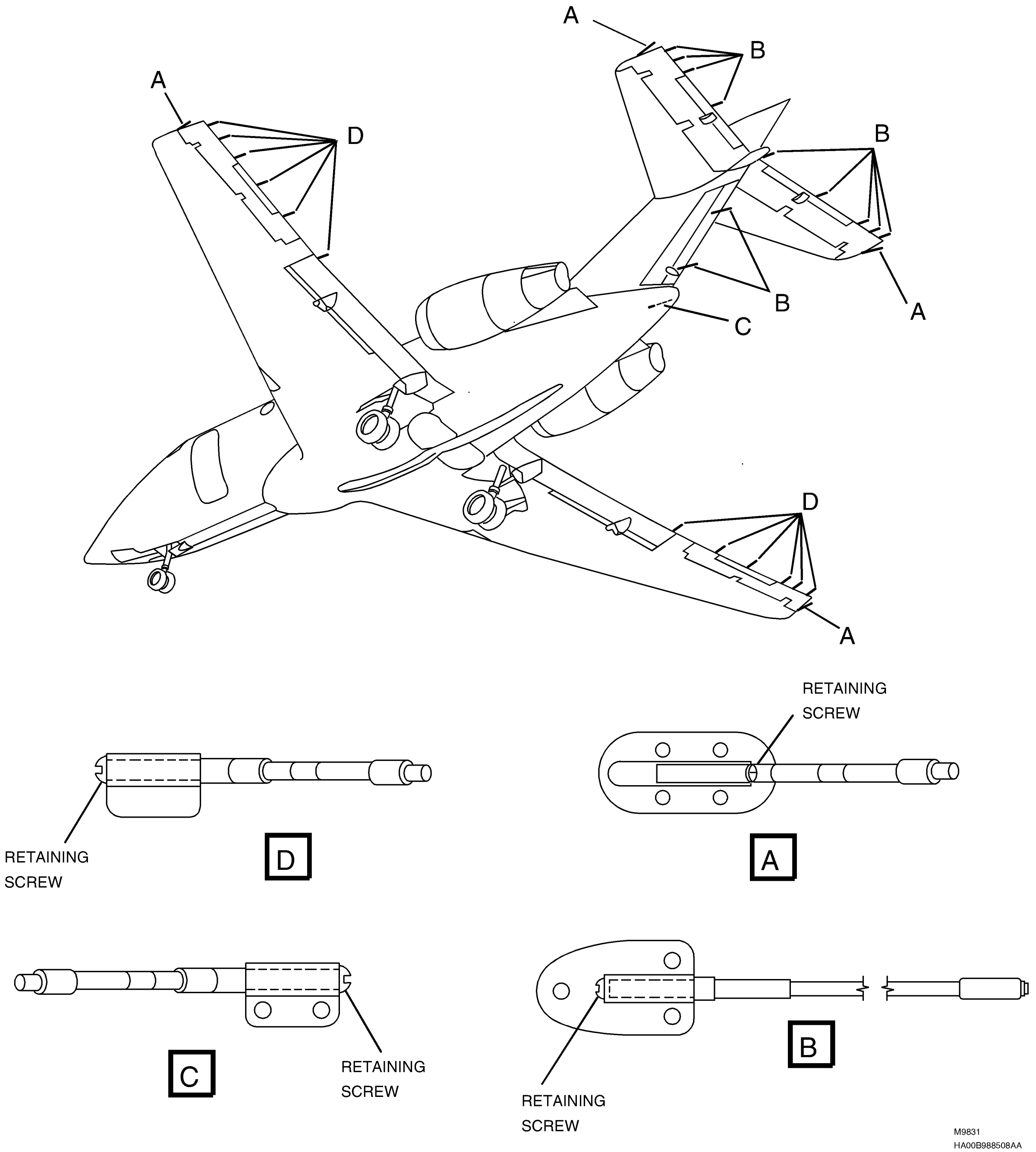


Figure 1 (Sheet 1 of 2)
Arrangement of Static Discharge Probes (800XP)

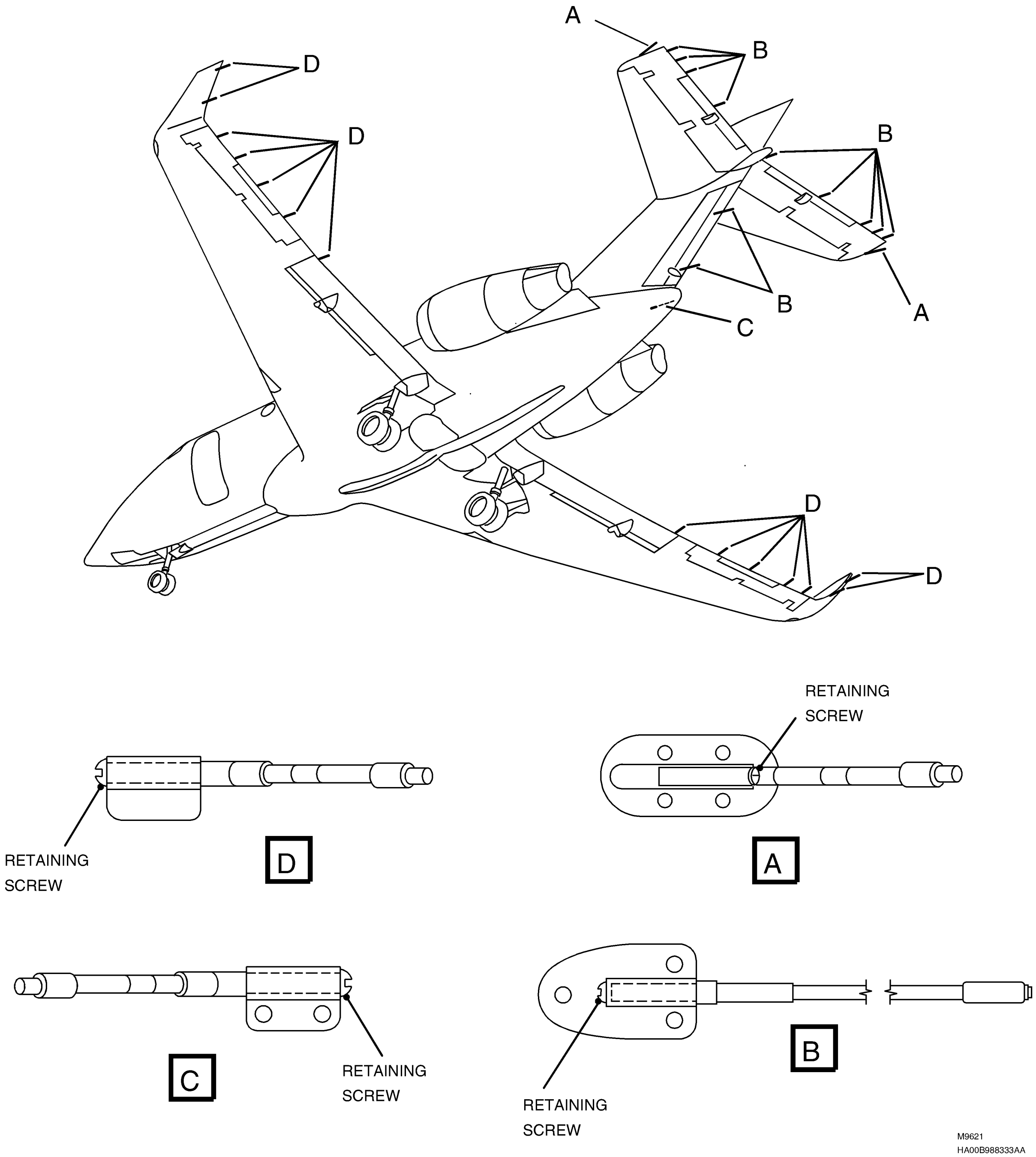


Figure 1 (Sheet 2 of 2)
Arrangement of Static Discharge Probes (800XP with HBC Winglets)

COMMUNICATIONS
STATIC DISCHARGING
STATIC DISCHARGE PROBE (STRAIGHT)
MAINTENANCE PRACTICES

1. INFORMATION

CAUTION: *Hawker Beechcraft Corporation strongly recommend that all static discharger probes on a control surface are of the same part number.*

CAUTION: *When a static discharge probe, on a control surface, is replaced with a discharge probe of a different part number or manufacture, the control surface must be re-balanced in accordance with the SRM (Ref. SRM 51-60-00, 001).*

NOTE: The following Removal/Installation procedure is applicable to static discharge probes supplied by Chelton (Pre-Mod.25F833A, B or C), H.R. Smith (Mod.25F833A, B or C) and Dayton Granger.

Equipment/Materials	Part/Item No.
Megohmmeter 500 volt (minimum)	Local supply
Bonding test set (Non-winglet positions only)	Local supply

2. REMOVAL/INSTALLATION

A. Probe Removal

	MECH	INSP
CAUTION *Do not attempt to release the discharge probe by pulling on the rod.* (1) Loosen the retaining screw at the discharge probe by two or three turns. Support the base and push or tap the screw to release the grip of the taper on the probe in the base (Ref. Figure 201 or Figure 202).		
(2) With the taper grip released, remove the retaining screw completely and remove the discharge probe.		

B. Probe Installation

	MECH	INSP
(1) Remove the retaining screw from the end of the discharge probe.		
(2) Put the discharge probe lightly into the base and engage the retaining screw by a few turns.		

	MECH	INSP
CAUTION *Do not attempt to push the discharge probe into its socket by pressure on the rod or tip.* (3) Push the discharge probe firmly home into the base by finger pressure on the thick end of the tapered sleeve.		
(4) Tighten the retaining screw to install the probe, while holding the sleeve to prevent turning, tighten the screw a further two full turns to pull the taper sleeve into tight engagement.		

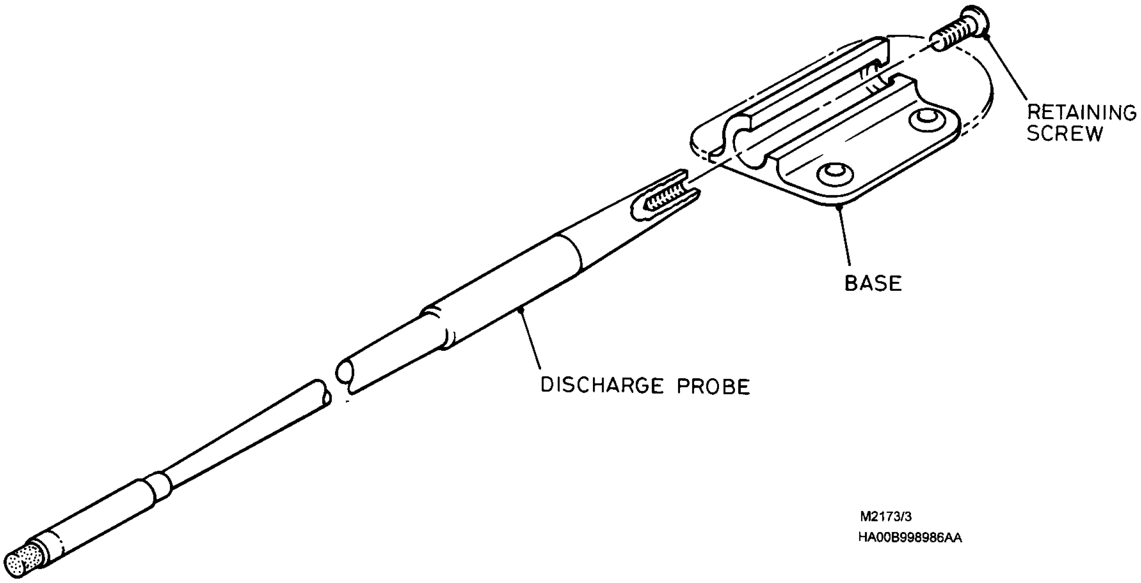


Figure 201
Static Discharge Probe (Non-winglet Positions)

3. ADJUSTMENT/TEST

A. Discharge Probe Resistance Test

(1) Attach a crocodile clip to one lead of the megohmmeter and a test probe with conductive pad to the other lead.

(2) Connect the crocodile clip to the aluminum tapered sleeve, and the test probe to the tip of the discharge probe, make sure that the carbon composite insert is not damaged.

(3) Make sure the resistance is between 6 and 120 megohms at 77°F (25°C) with the megohmmeter.

(4) Remove the test leads.

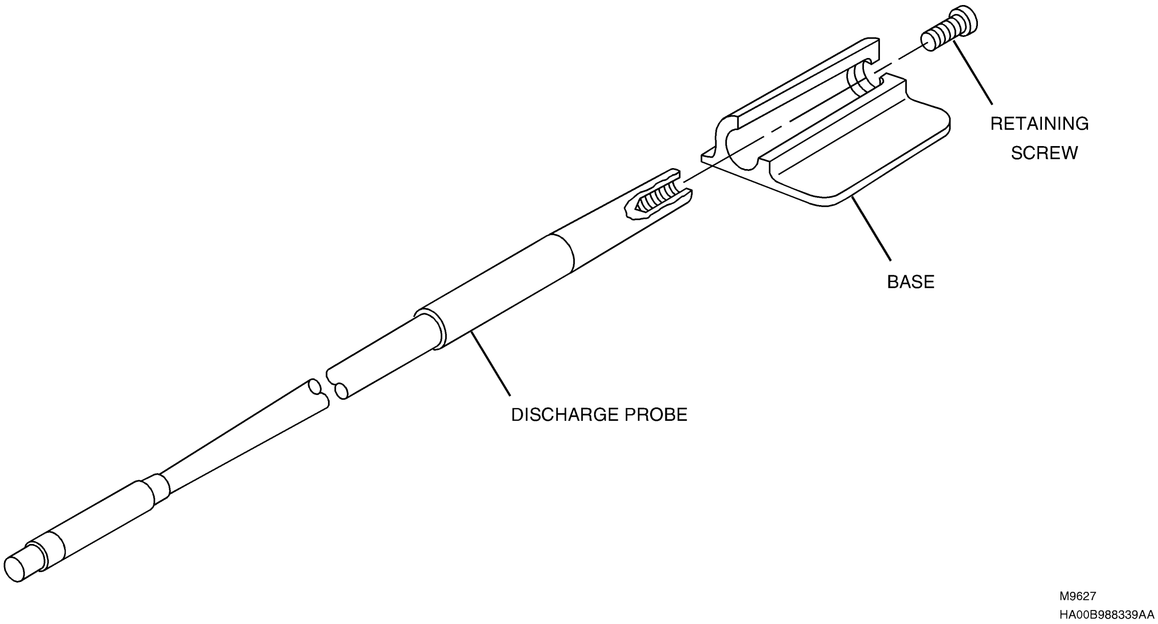


Figure 202
Static Discharge Probe (Winglet Positions Only)

B. Discharge Probe Bonding Test (non-winglet positions)

(1) Use a bonding test set, make sure that the resistance between the base assembly and the adjacent airplane skin does not exceed 0.05 ohm.

4. INSPECTION/CHECK

A. Visual Inspection/Check

(1) Make sure that the discharge probes are installed in their correct position on the airplane (Ref. 23-60-02, 201).

(2) Do a visual inspection on each discharge probe for any obvious damage.

NOTE: Discharge probes are non-repairable and must be replaced when damaged.

STATIC DISCHARGE PROBE (ANGLED) - MAINTENANCE PRACTICES

1. Removal/Installation (*Figure 201)*

NOTE: The following Removal/Installation procedure is applicable to static discharge probes supplied by Chelton (Pre-Mod.25F833A, B or C), HR Smith (Mod.25F833A, B or C) and Dayton Granger.

A. Remove the discharge probe

(1) Loosen the retaining screw at the base of the discharge probe by two or three turns.

CAUTION: DO NOT USE THE DISCHARGE PROBE TO ASSIST REMOVAL.

(2) Remove the discharge probe from the base.

B. Install the discharge probe

CAUTION: THE RAYTHEON AIRCRAFT COMPANY STRONGLY RECOMMEND THAT ALL STATIC DISCHARGE PROBES ON A CONTROL SURFACE ARE OF THE SAME PART NUMBER.

CAUTION: WHEN A STATIC DISCHARGE PROBE, ON A CONTROL SURFACE, IS REPLACED WITH A DISCHARGE PROBE OF A DIFFERENT PART NUMBER OR MANUFACTURE, THE CONTROL SURFACE MUST BE RE-BALANCED IN ACCORDANCE WITH THE SRM (CHAPTER 51, CONTROL SURFACE BALANCING).

CAUTION: DO NOT APPLY PRESSURE TO THE DISCHARGE PROBE TO HELP INSTALLATION.

(1) Install the discharge probe into the base. Engage and tighten the screw.

2. Adjustment/Test

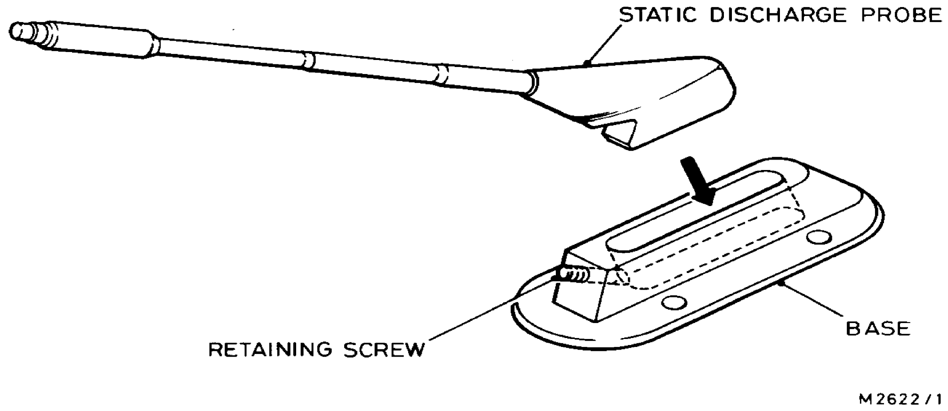
Equipment/Material	Part/Item No.
500 volt (minimum) megohmmeter	Local supply
Bonding test set	Local supply

A. Discharge probe resistance test

(1) Attach a crocodile clip to one lead of the megohmmeter and a test probe with conductive pad to the other lead.

(2) Connect the crocodile clip to the base insert, and the test probe to the discharger tip, make sure that the carbon composite insert is not damaged.

(3) Make sure that the resistance is between 6 and 120 megohms at 77°F (25°C) with the megohmmeter.



Static discharge probe
Figure 201

(4) Remove the test leads.

B. Test the bonding of the discharge probe

(1) Use a bonding test set, make sure that the resistance between the base assembly and the adjacent airplane skin does not exceed 0.05 ohm.

3. Inspection/Check

A. Do a visual inspection/check

(1) Make sure that the discharge probes are installed in their correct position on the airplane (STATIC DISCHARGING).

(2) Do a visual inspection on each discharge probe for any obvious damage.

NOTE: Discharge probes are non-repairable and must be replaced when unserviceable.

COMMUNICATIONS
STATIC DISCHARGING
STATIC DISCHARGE PROBE BASE REMOVAL/INSTALLATION

1. STATIC DISCHARGE PROBE BASE

A. Removal

	MECH	INSP
(1) Remove the sealing compound from the discharge probe base and surrounding structure using a non-metallic scraper.		
(2) Remove the rivets which attach the base to the structure and lift off the base.		

B. Installation

	MECH	INSP
(1) If necessary form the base to the contour of the structure to which it is to be installed.		
(2) Prepare the mating surfaces (Ref. AMM 125/H-20, 20-10-5016, 201 - Method 10).		
(3) After inspection, immediately assemble the base to the structure using the applicable rivets.		
(4) Seal the base to the structure and do a bonding check (Ref. AMM 125/H-20, 20-10-5016, 201 - Method 10).		

COLLINS (RTU-870A) RADIO TUNING UNIT DESCRIPTION AND OPERATION

1. General

The radio tuning unit (RTU) is a panel mounted unit that gives centralized control and display of frequency/code and operating modes of the following systems:

- VHF communications (VHF COMM)
- VHF navigation (VHF NAV)
- distance measuring equipment (DME)
- air traffic control transponder (ATC)
- automatic direction finder (ADF).

The RTU interfaces with these systems by way of a serial digital ARINC 429 data bus. In normal operation the RTUs only control their on-side radios, if a RTU fails the remaining RTU can control both on-side and cross-side radios by use of the 1/2 switch.

Each RTU is switched on and off by a switch/annunciator adjacent to the RTU.

2. Description (*Figure 1 and Figure 2*)

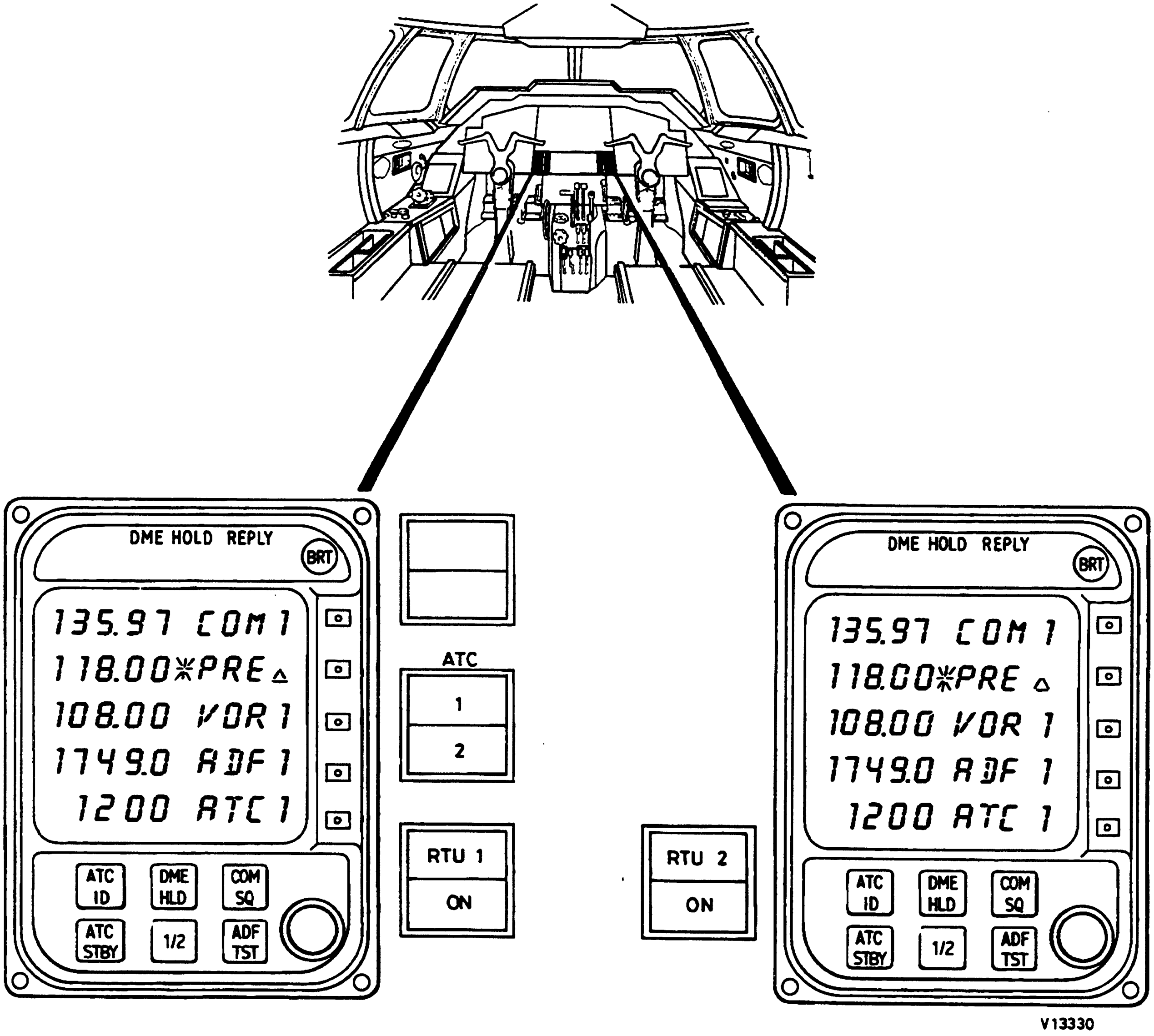
Two RTUs are installed on the centre instrument panel. The RTU is attached to the panel with four self-contained integral mounting clamps, one in each corner. A bayonet type plug at the rear of the RTU provides connection to the aircraft electrics and the related systems.

In addition to the display, the front panel of the RTU gives various types of control to operate the system. The controls and their functions are as follows:

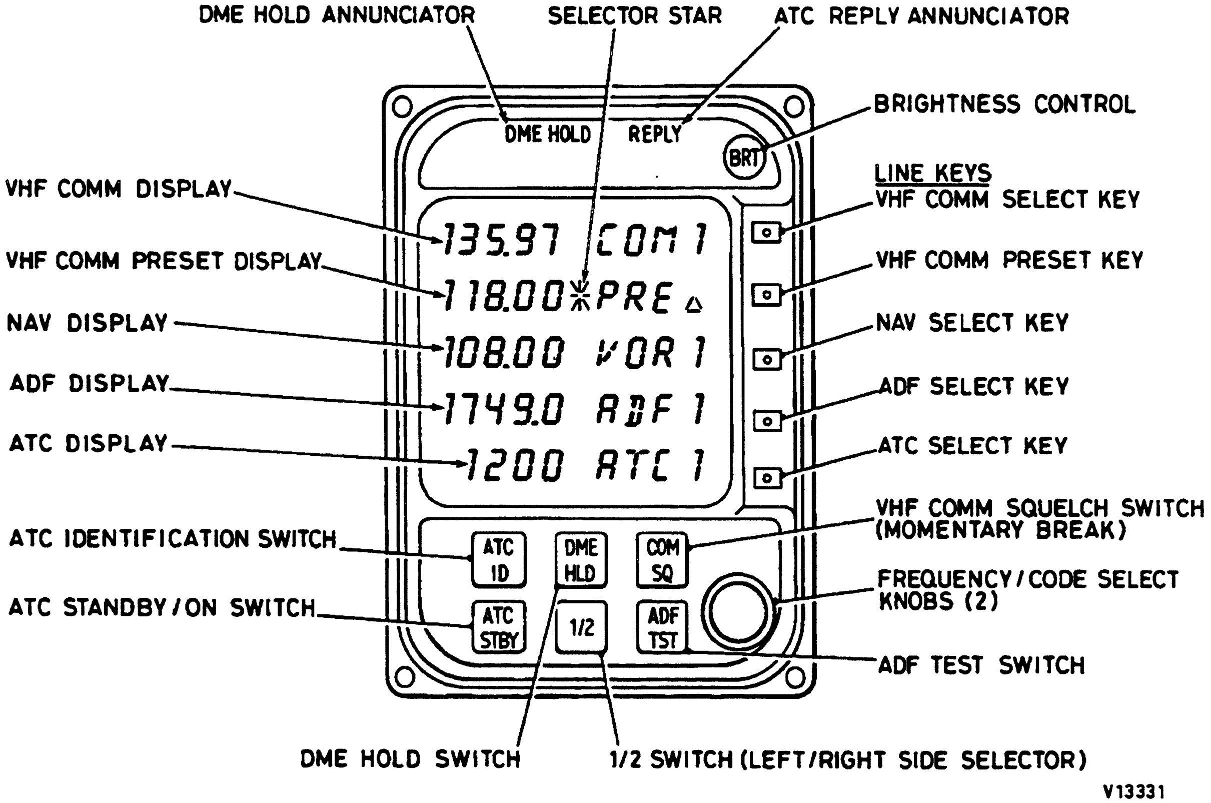
Brightness control	This is a rotary control labelled BRT at the top RH corner of the RTU. It is used in combination with the DIGITS dimmer control, on the centre instrument panel, to adjust the brightness of the displays
Frequency/code select controls	These are two concentric rotary controls at the bottom RH corner of the RTU; they are used to change the frequency or code shown on the starred display line. The larger control changes the most significant digits and the small control the two least significant digits of the display

Six pushbutton switches are located at the bottom of the RTU. They function as follows:

ATC identification switch	Labelled ATC ID, this switch is only active on the RTU which is controlling the selected transponder. When requested by the ground controller for identification, pushing the ATC ID switch causes the transponder to transmit a special identification signal that is shown on the ground controllers screen. When the ATC ID switch is pushed ID is shown instead of ATC on the ATC display for approximately 20 seconds.



RTU - component location (typical)
Figure 1



Radio tuning unit
Figure 2

ATC standby/on switch	Labelled ATC STBY, this switch is only active on the RTU which is controlling the selected transponder. The first push of the switch applies power to the transponder but stops it from transmitting (standby mode). Pushing the switch again gives replies to ground interrogations. When in the standby mode STBY is shown instead of ATC on the ATC display.
DME hold switch	Labelled DME HLD, this switch enables the current DME frequency to be held and allows the receiver to be independently tuned. When this switch is pushed a DME HOLD annunciator (at the top centre of the RTU) comes on. Pushing the DME HLD switch a second time cancels hold and the DME tunes to the new active frequency. The DME HOLD annunciator goes off.
1/2 switch	Normally each RTU controls and shows only the on-side systems i.e. RTU No.1 controls system No.1. Push and hold the 1/2 switch to show the cross-side frequencies.
Comms squelch switch	Labelled COM SQ, when pushed, this switch disables the VHF COMM receiver squelch circuits. When the switch is released the squelch circuits return to normal.

ADF test switch	Labelled ADF TEST, this switch starts the ADF self-test routine. TEST is shown instead of ADF on the ADF display while the switch is pushed.

Selector star

The selector star indicates which system can be tuned and mode page shown, and is normally on the PRE line and automatically returns to the PRE line after approximately 15 seconds of control or switch inactivity.

Line keys

The line keys have various functions. Push a line key next to a line not marked by the selector star and the selector star moves to that line. Pushing a line key next to a line marked by the selector star shows the mode page for the selected system. The mode pages give the line keys further functions which are explained in paragraph 3.

On the right of each system line is the digit 1 or 2. This shows which system is in operation and tuned to the shown frequency.

3. Operation (*Figure 3 and Figure 4*)

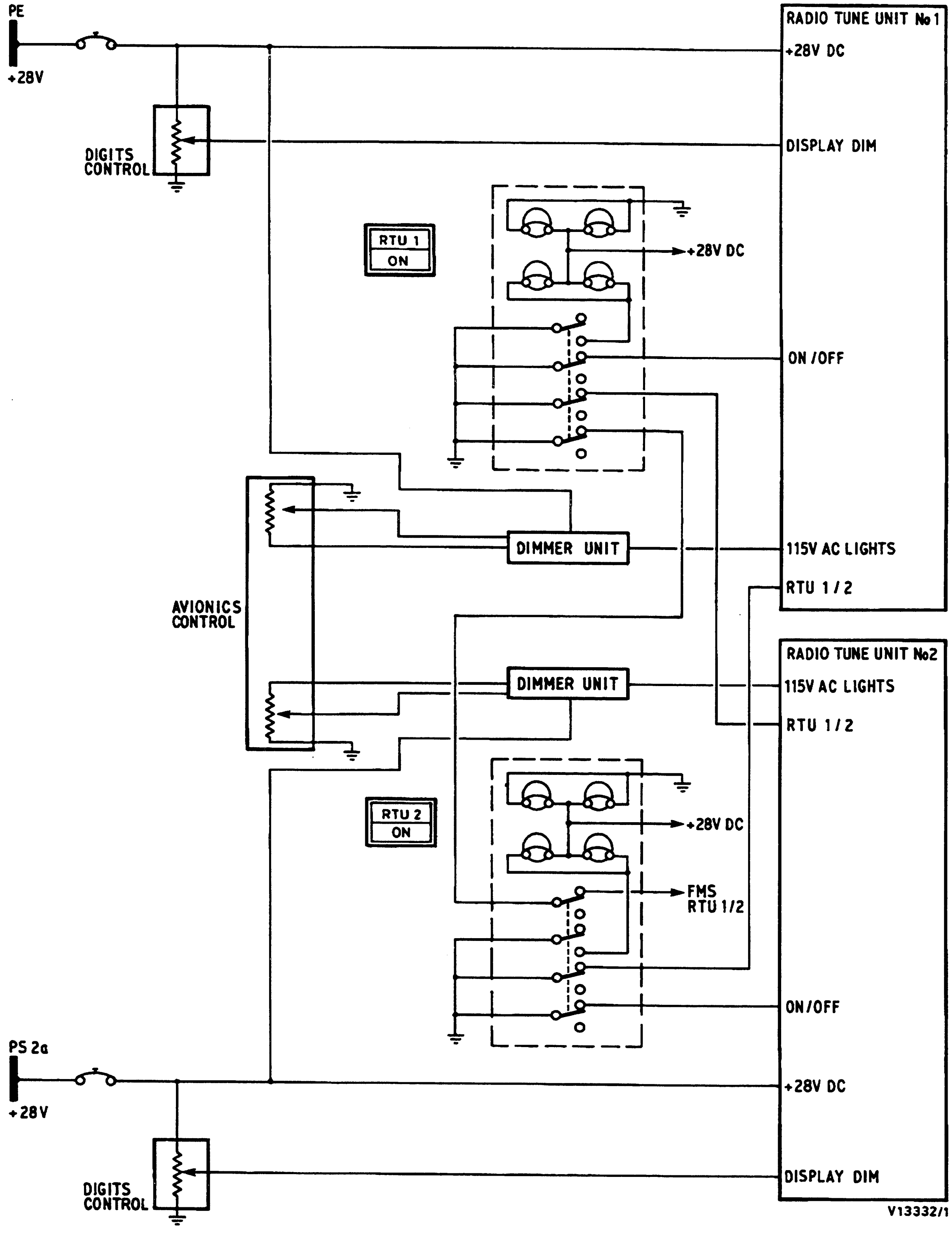
With the busbars energized +28 volts d.c. is available to both RTUs. Each RTU has its own power supply board which develops all the supplies necessary for the correct operation of the RTU. The +28 volts d.c. also goes to the DIGITS and AVIONICS controls on the centre instrument panel. When the RTU 1 and RTU 2 annunciator/switches are pushed to the on position the ON annunciator comes on and the RTUs are operational.

The brightness of the display is set by using the RTU BRT control in combination with the DIGITS control. The BRT control has a dead spot arc of approximately 20 degrees near the middle of its adjustment range. Display brightness does not alter within the dead spot arc.

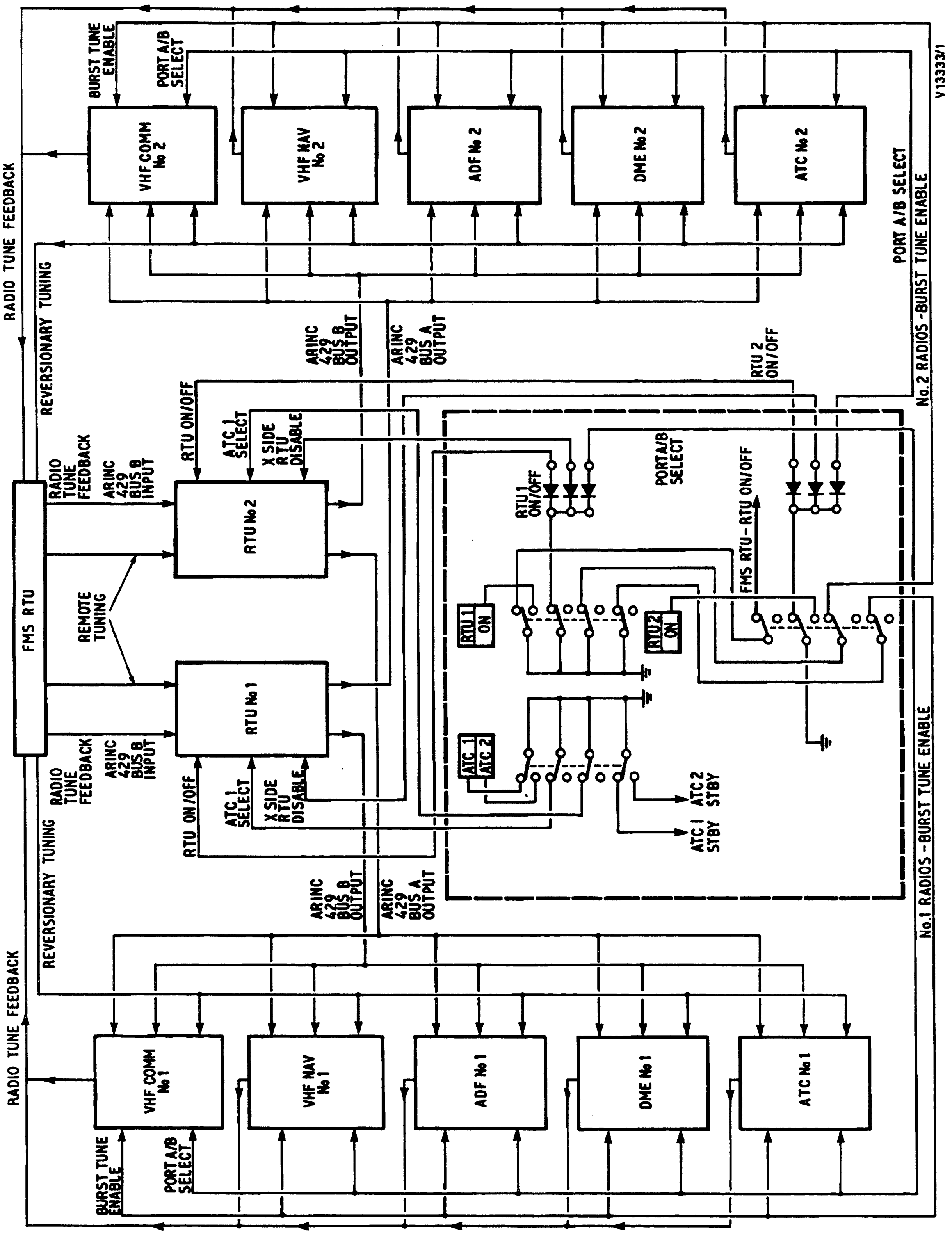
To adjust the brightness of the display, set the DIGITS control to its mid position and then set the BRT control to the middle of its dead spot. Control of the display brightness is then performed by using the DIGITS control.

The background lighting of the RTU is adjusted using the AVIONICS control.

Operation and control of all the various related systems is by selecting and tuning the system and then selecting the different modes of the system.



RTU - power and dimming block diagram
Figure 3



RTU block diagram
Figure 4

VHF COMM (*Figure 5*)

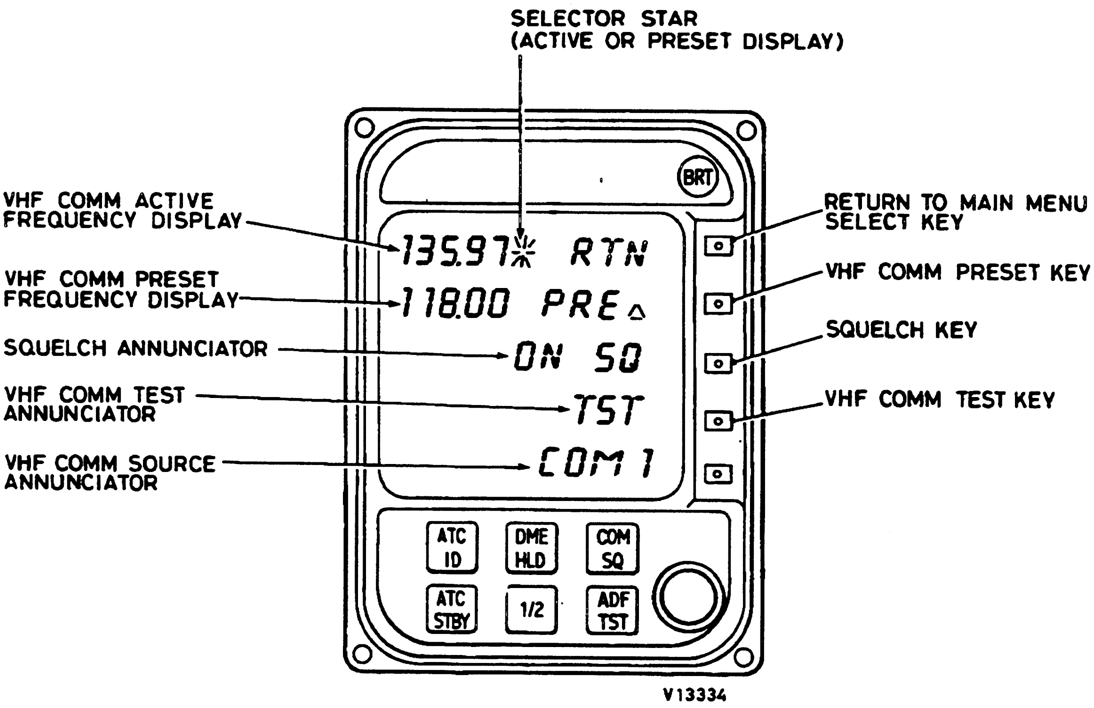
Push the COM line key to put the selector star on the COM line. Use the frequency/code select controls to tune the VHF COMM to the required frequency. Push the COM line key again to show the VHF COMM mode page. The controls and displays for the VHF COMM are as follows:

VHF COMM active frequency display	This display shows the VHF COMM radio frequency selected.
VHF COMM preset frequency display	This display shows the preset VHF COMM radio frequency selected.
VHF COMM source annunciator	Shows which system (1 or 2) is being tuned by the RTU.
Selector star	Shows which VHF COMM frequency can be changed by the frequency select controls.
Return to main menu select key	Push the RTN key to move the selector star to the active frequency display. Push the RTN key again to return to the RTU main menu page.
VHF COMM preset key	Push the PRE key to move the selector star to the preset frequency line. An upward pointing triangle shows to the right of the PRE legend. Push the key again to interchange the preset and active frequencies. The VHF COMM tunes to the new active frequency and the previous active frequency becomes the new preset frequency.
Squelch key and annunciator	Push the SQ key to enable (ON SQ) or disable (OFF SQ) the system squelch circuits.
VHF COMM test key	Push the TST key to start a VHF COMM system self-test. An annunciator ON TST shows. When the key is released the ON legend disappears and the test mode stops.

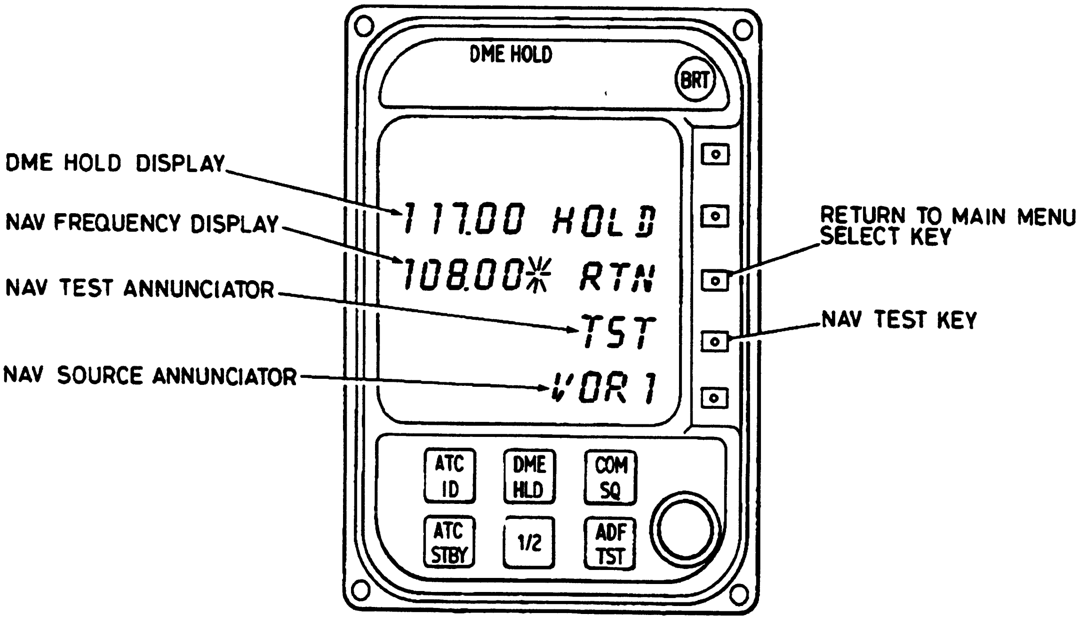
VHF NAV AND DME (*Figure 6*)

Push the NAV select key to put the selector star on the NAV line (VOR or ILS). Push the NAV select key again to show the NAV mode page. The controls and displays for the NAV mode are as follows:

NAV frequency display	shows the active VHF NAV/DME tuning frequency/channel that can be directly changed by the frequency/code selector controls.
NAV source annunciator.	The NAV source annunciator shows which part of the system is being tuned by the RTU. VOR or ILS shows depending on the selected VHF NAV frequency; AUT shows when the radio is being tuned by the FMS.
NAV test key and annunciator	The annunciator TST shows beside the NAV test key. Push and hold the NAV test key to start the VOR system self-test routine. The annunciator ON TST shows. Release the NAV test key and the test mode is disabled. The annunciator changes to TST.


SELECTOR STAR
(ACTIVE OR PRESET DISPLAY)
VHF COMM ACTIVE FREQUENCY DISPLAY
VHF COMM PRESET FREQUENCY DISPLAY
SQUELCH ANNUNCIATOR
VHF COMM TEST ANNUNCIATOR
VHF COMM SOURCE ANNUNCIATOR
RETURN TO MAIN MENU SELECT KEY
VHF COMM PRESET KEY
SQUELCH KEY
VHF COMM TEST KEY
BRT
135.97 RTN
118.00 PRE
ON SQ
TST
COM 1
ATC ID
DME HLD
COM SQ
ATC STBY
1/2
ADF TST
V13334

VHF COMM mode page
Figure 5



NAV mode page
Figure 6

DME hold display	When the DME HLD switch is pushed this display shows, together with the DME HOLD annunciator. The display shows the frequency the DME is held to.
Return to main menu select key	Push the RTN key to return to the main menu page.

ADF (*Figure 7*)

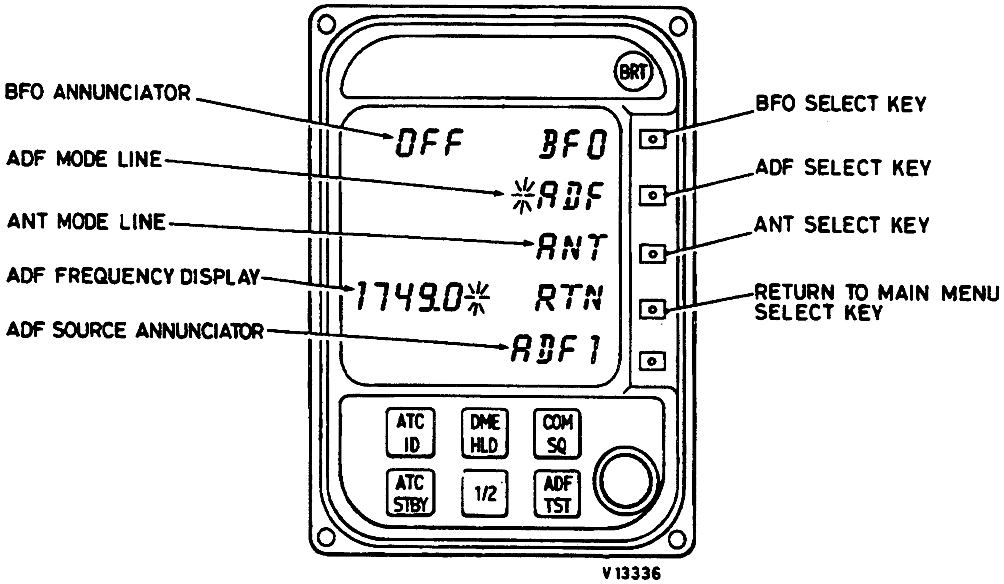
Push the ADF select key to put the selector star on the ADF line. Push the ADF select key again to display the ADF mode page. The controls and displays for the ADF mode are as follows:

ADF frequency display	Shows the active ADF frequency that can be changed by the frequency/code select controls.
ADF source annunciator	Shows which ADF system is being tuned by the RTU.
ADF select key	Push this key to select the ADF mode (shown by the selector star on this line). The ADF system gives bearing to the station and aural outputs in the ADF mode.
ANT select key	Push this key to select the ANT mode (shown by the selector star on this line). The ADF system gives only an aural output in the ANT mode.
BFO select key	Push this key to select (ON BFO) or deselect (OFF BFO) the BFO mode. The ADF system gives a 1kHz aural output in the BFO mode when a keyed CW signal is received.
Return to main menu select key	Push the RTN key to return to the main menu page.

ATC (*Figure 8*)

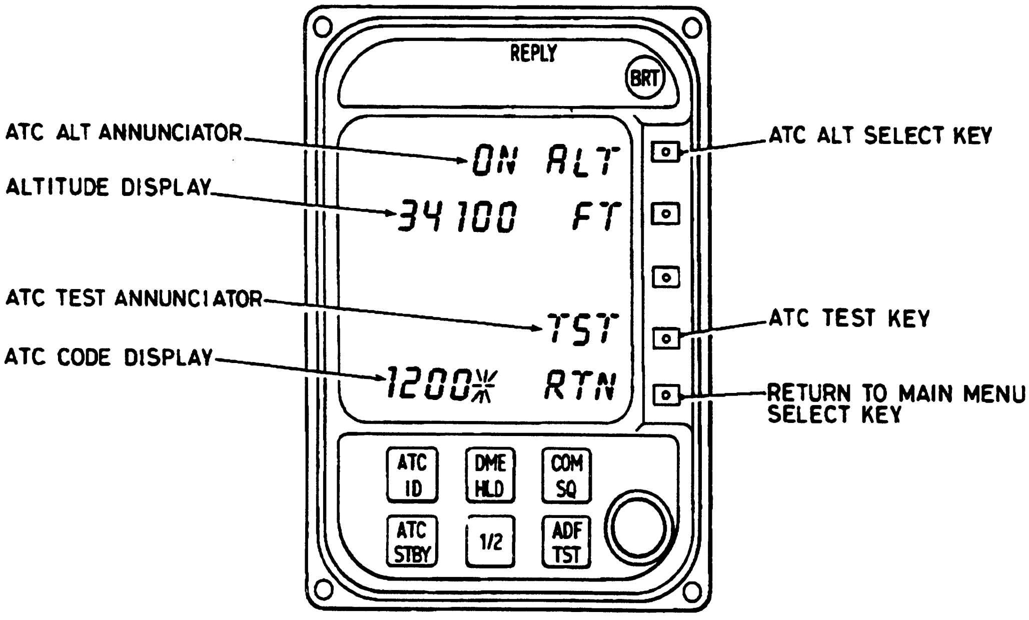
Push the ATC select key to put the selector star on the ATC line. Push the ATC select key again to display the ATC mode page. The controls and displays for the ATC mode are as follows:

ATC code display	Shows the selected transponder reply code that can be changed by the frequency/code select controls
ATC ALT select key and annunciator	Push this key to select the altitude reporting (ON ALT) or reply (OFF ALT) mode.
Altitude display	Shows the uncorrected barometric altitude that is transmitted in the ON ALT mode.
ATC test key and annunciator	Push and hold this key to start the transponder self-test routine (ON TST). Release the key and the self-test routine stops (TST).
Return to main menu select key	Push the RTN key to return to the main menu page



ADF mode page

Figure 7



ATC mode page

Figure 8

RADIO TUNING UNIT - ADJUSTMENT/TEST

1. Operational test

Equipment/Material	Part/Item No.
Headsets (2 off)	-

A. Functionally test radio tuning units

Preliminary procedure

(1) Energize the aircraft busbars (Chapter 24, General).

(2) On the centre console, press the RTU1 switch; the ON annunciator comes on, and RTU 1 display shows the main menu page with the selector star on the PRE line.

(3) On the centre instrument panel turn fully clockwise and fully counter clockwise the AVIONICS dimmer and DIGITS dimmer controls. The integral background lighting of RTU 1 varies by means of the AVIONICS control, and the brightness of the display varies by means of the DIGITS control.

(4) Set both controls to the mid position.

(5) On the RTU 1 turn the BRT control fully clockwise, then fully counter-clockwise. The brightness of the display varies in accordance with the control except that at approximately ± 10 degrees of the mid position there is a dead spot where the brightness does not vary.

(6) Set the BRT control to the mid-position.

Procedure

NOTE: When any mode page shows, the RTU will automatically revert to the main menu display after 25 seconds of switch inactivity.

ACTION		RESULT
(7) On RTU 1, use the frequency/code select controls to set the PRE frequency to 118.75 MHz.	...	The COM 1 line shows 118.75.
(8) On RTU 1 press the VHF COMM select key.	...	Selector star moves to the COM 1 line.
(9) On RTU 1 press and hold the 1/2 switch.	...	The COM line shows COM 2 and the selector star moves to the PRE line.
(10) On RTU 1 release the 1/2 switch.	...	The COM line shows COM 1.
(11) On RTU 1 press the VHF COMM select key.	...	Selector star moves to the COM 1 line.

ACTION		RESULT
(12) Set the COM 1 frequency to 127.05 MHz.	...	127.05 shows on the COM line. After approximately 25 seconds the selector star returns to the PRE line.
(13) On RTU 1 press the VHF COMM select key twice.	...	The COM 1 mode page shows on RTU 1.
(14) On RTU 1 press the squelch key as necessary.	...	ON SQ shows on RTU 1.
(15) Connect a headset to the HEADSET jack-socket on the LH side console.	...	-
(16) On the LH audio select panel (ASP) press the VHF 1 (white) and VHF 1 (orange) push-switches to the on position. Set the VHF 1 (white), S/T and VOL rotary controls to their mid-position.	...	VHF No.1 system is selected on the LH ASP.
(17) On RTU 1 press and release the COM SQ switch.	...	Receiver squelch is momentarily disabled. After approximately 25 seconds the main menu page returns with the selector star on the PRE line.
(18) On RTU 1 press the VHF COMM preset key.	...	The active VHF COMM and preset VHF COMM frequencies are interchanged. The upward pointing arrow is always shown on the PRE line.
(19) On RTU 1 press the VHF COMM select key twice.	...	The COM mode page shows on RTU 1.
(20) On RTU 1 press and hold the VHF COMM test key.	...	The TST line shows ON TST.
(21) Release the VHF COMM test key.	...	The TST line shows TST. After approximately 25 seconds the main menu page returns with the selector on the PRE line.
(22) On RTU 1 press the 1/2 switch.	...	The COM line shows COM 2.
(23) Repeat paragraphs (7) to (21) inclusive.	...	RTU 1 controls VHF COMM 2 tuning and squelch operations.
(24) On RTU 1 press the 1/2 switch.	...	The COM line shows COM 1 and the selector star is on the PRE line.
(25) Press RTU 1 NAV select key.	...	The selector star moves to the NAV line.

ACTION	RESULT
(26) On RTU 1 set the NAV frequency to 116.00 MHz. ...	The NAV line shows a VOR annunciation.
(27) On RTU 1 press and hold the NAV test key. ...	The TST line shows ON TST.
(28) Release the NAV test key. ...	The TST line shows TST.
(29) On RTU 1 press the DME HLD switch. ...	The DME HOLD annunciator comes into view at the top of the RTU.
(30) On RTU 1 set the NAV frequency to 117.00 MHz. ...	The DME HOLD annunciator stays in view and the VOR 1 frequency changes to 117.00.
(31) On RTU 1 press the DME HLD switch. ...	The DME HOLD annunciator goes off.
(32) On RTU 1 set the NAV frequency to 110.10 MHz. ...	The NAV line shows an ILS 1 annunciation. After approximately 25 seconds the selector star returns to the PRE line.
(33) On RTU 1 press the NAV key twice. ...	The NAV mode page shows on RTU 1.
(34) On RTU 1 press the RTN key. ...	The main menu page returns with the selector star on the PRE line.
(35) On RTU 1 press the 1/2 switch. ...	The NAV line shows an ILS 2 annunciation.
(36) Repeat paragraphs (25) to (34) inclusive. ...	RTU 1 controls VHF NAV 2 tuning.
(37) On RTU 1 press the 1/2 switch. ...	The NAV line shows ILS 1 and the selector star is on the PRE line.
(38) On RTU 1 press the ADF select key. ...	The selector star moves to the ADF line. ADF 1 shows on the ADF line.
(39) On RTU 1 set an ADF frequency of 1089.0 kHz. ...	The ADF line shows 1089.0.
(40) On RTU 1 press and release the ADF TEST switch. ...	The ADF line annunciation changes to TEST and then returns to ADF. After approximately 25 seconds the main menu page shows with the selector star on the PRE line.
(41) On RTU 1 press the ADF select key twice. ...	The ADF mode page shows on RTU 1.
(42) On RTU 1 press the RTN key. ...	The main menu page shows with the selector star on the PRE line.

ACTION	RESULT
(43) On RTU 1 press the ADF select key twice.	The ADF mode page shows on RTU 1. After 25 seconds the main menu page shows with the selector star on the PRE line.

NOTE: It may be necessary to place the aircraft outside the hangar on APU power if unreliable ADF audio is received due to signal reflections from surrounding equipment

ACTION	RESULT
(44) On RTU 1 press the ADF select key twice.	The ADF mode page shows on RTU 1.
(45) On RTU 1 set the frequency of an in-range broadcast station.	-
(46) At the Captain's and F/O's ASPs press the ADF 1 and ADF 2 push-switches to the on position.	ADF 1 audio is audible in the headsets.
(47) On RTU 1 press the BFO select key.	The BFO line shows ON BFO. A beat frequency is added to the ADF 1 audio on the headsets.
(48) On RTU 1 press the BFO select key.	The BFO line shows OFF BFO.
(49) On RTU 1 press the ANT select key.	The selector star moves to the ANT line. ADF 1 audio is audible in the headsets.
(50) On RTU 1 press the ANT select key.	The selector star moves to the ADF line.
(51) On RTU 1 press the ADF TEST switch.	TEST shows on the ADF mode line instead of ADF. ADF audio is audible in the headsets.
(52) On RTU 1 press the ADF TEST switch.	TEST annunciation goes out of view and the *ADF annunciation returns.
(53) On RTU 1 press the 1/2 switch.	The ADF mode page shows ADF 2.
(54) Repeat paragraphs (38) to (52) inclusive.	RTU 1 controls the functions of ADF 2.
(55) On RTU 1 press the 1/2 switch.	The ADF mode page shows ADF 2.
(56) On RTU 1 press the ATC select key.	The selector star moves to the ATC line.
(57) On RTU 1 use the frequency/code select controls to set in the code 1234.	ATC line code changes to 1234.
(58) On RTU 1 press the ATC STBY switch.	The ATC code display shows STBY.
(59) On RTU 1, again press the ATC STBY switch.	The ATC code display shows 1234.

ACTION	RESULT
(60) On RTU 1 press the ATC ID switch.	The ATC annunciation changes to ID for approximately 10 seconds and then reverts to ATC. After approximately 25 seconds the main menu page shows with the selector star on the PRE line.
(61) On RTU 1 press the ATC select key twice.	The ATC mode page shows on RTU 1.
(62) On RTU 1 press the RTN key.	The main menu page shows with the selector star on the PRE line.
(63) On RTU 1 press the ATC STBY switch.	A STBY annunciation shows on the ATC line.
(64) On RTU 1 press the ATC select key.	The ATC mode page shows on RTU 1.
(65) On RTU 1 use the necessary controls and switches as required.	The ATC mode page shows the following: • OFF ALT • TST • 0000 RTN The selector star is on the RTN line.
(66) On RTU 1 press and hold the ATC test key.	The ON annunciation shows on the TST line.
(67) Release the ATC test key.	The ON annunciation goes off the TST line.
(68) On the centre console press both RTU switches.	On RTU 1 switch the ON annunciator goes off and on RTU 2 switch the ON annunciator comes on.
(69) On centre instrument panel press the ATC 1/2 switch.	ATC 1 annunciator goes off and ATC 2 annunciator comes on.
(70) Repeat paragraphs (3) to (67) for RTU 2, and using RH jack sockets and ASP, and appropriate ASP controls.	-

Concluding procedure

(71) De-energize the aircraft busbars (Chapter 24, GENERAL).

(72) Remove the headsets from the aircraft.

(73) Make sure that the working area is clean, and clear of all tools and miscellaneous equipment.

CHAPTER 23
PART 2
COMMUNICATIONS
(HONEYWELL)

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SINGLE/DUAL KING KHF-950 HF COMMUNICATIONS SYSTEM - TROUBLESHOOTING

1. General

This section addresses HF communication system Electromagnetic Interference (EMI) with other onboard avionics and electrical systems, including the fuel quantity indication and engine indication systems.

Due to the amount of transmitted power, frequency spectrum involved and the design characteristics of the HF antenna, HF transmitters are one of the most troublesome sources of EMI. They often cause fluctuations in fuel quantity indication, engine indication and other airplane systems indication. Most of these fluctuations present themselves as a spike in fuel quantity or engine indication when transmission is occurring, or as fluctuations that are in synchronization with the voice modulation and return to the original indication when transmission ends.

2. Procedure

The susceptibility of onboard avionics and electrical systems to EMI produced by the HF communication system can be checked by doing the HF Communication System Functional Test (23-10-18, ADJUSTMENT/TEST). Using this procedure check for avionics and electrical system indication fluctuation while transmitting on random frequencies between the range of 3.000 MHz and 25.000 MHz.

NOTE: When transmitting in the USB (A3J) mode talk loudly and observe the suspect indication for signs of EMI fluctuation, outside of the noted limits.

NOTE: When transmitting in the AM (A3H) mode, key the transmitter (modulatation is not necessary) and observe the suspect indication for signs of EMI fluctuation for trouble shooting purposes only.

NOTE: The KHF-950 HF / SSB Communication System with KFS 594 Control Unit should not be operated in the AM (A3A) Mode (As per the Bendix/King KHF-950 System Operational and Installation Manual).

Raytheon Aircraft Company (RAC) considers the following indication fluctuations to be normal and acceptable providing that the indicators return to normal reading when the HF transmission ceases, (the interference should be noted by the Flight Crew but it is not considered to be excessive or detrimental to flight safety).

- 200 lbs. on fuel Quantity indicators
- 1% on N_1 indicators
- ½% on N_2 indicators
- 50º C on ITT indicators
- 10% of the indicator maximum limit is the amount of EMI permitted in other cockpit or cabin indicators (i.e. oil temperature, oil pressure, flap position and cabin/duct temperature, etc.)
- No fluctuations are permitted in navigational indications (i.e. VOR, LOC, GPS, Glide Slope, etc.) except as permitted in the Aircraft Flight Manual Limitations section.

NOTE: Fluctuations in engine indications is permissible as listed above, however NO fluctuations are permitted in actual engine performance.

Fluctuations in excess of the above referenced limits or indications that do not return to normal when HF transmission ceases are not acceptable and the HF should be disabled until the affected airplane system is checked by an Authorized Service Center.

There are several troubleshooting points that should be kept in mind when trying to eliminate or reduce the amount of interference on any airplane that is experiencing indicator fluctuations while transmitting on the HF Comm.

(1) It is possible that the excessive EMI may be caused by an internal condition to one of the HF system components.

(2) It is most likely that poor electrical bonding is the cause of the condition and the bonding of the HF Comm and affected airplane systems should be thoroughly investigated. Proper electrical bonding of all HF system components, accessories and the antenna itself cannot be overemphasized. Good RF bonding of the HF equipment to the airplane fuselage is basic in achieving maximum efficiency from the system and eliminating any possible EMI to other systems in the airplane.

  (a) Make sure that all paint, corrosion, etc., is removed from all equipment bonding points. This would include, (depending on the particular HF installation), the HF transceiver, the HF receiver/exciter, the HF power amplifier, the HF antenna coupler, the HF bridging amplifier and the HF antenna changeover unit.

  (b) All electrically bonded HF components should have less than 1.5 milliohms (0.0015 ohms) resistance to its mating surface. These mating surfaces should in turn have less than 1.5 milliohms resistance to the airframe.

  (c) The most common HF antenna installed on the Hawker 800XP is located in the leading edge of the vertical stabilizer. The antenna extends from frame 21 to the horizontal stabilizer, (approximately 100 in. (2.54 m)), and except for the upper end of the antenna, is insulated from the adjacent structure by fiberglass inserts. An antenna design of this type is referred to as a “shunt” antenna. Such an antenna produces no drag, exhibits an omnidirectional radiation pattern and if well bonded can provide good operational efficiency. Shunt antennas are suitable for high altitude airplane use because they do not develop extremely high voltages, however they do develop extremely high RF currents. Due to these high RF currents, good electrical bonding of the antenna is essential. The antenna is electrically bonded to the airframe at the top of the antenna.

  (d) If the HF antenna feed wire is removed from the antenna feed terminal at the base of the antenna, the antenna feed terminal should measure less than 1.5 milliohms resistance to the airframe.

  (e) All components of the antenna are designed and manufactured by RAC. In operation, RF energy from the HF is fed to the antenna at the antenna base. Due to the design characteristics of the antenna the entire airplane skin acts as a radiator for the HF signal. This makes it imperative that all airplane sub assemblies (skins, panels, control surfaces, doors, etc.) are bonded together to eliminate static buildup and energy re-radiation which can adversely affect the HF system performance and contribute to HF interference in other systems. These items should be checked for proper electrical bonding values as detailed in the Aircraft Maintenance Manual (AMM), Chapter 20. Proper electrical bonding of the affected airplane systems is also required to reduce EMI effect. All metallic components of the affected airplane system should have less than 1.5 milliohms (0.0015 ohms) resistance to the airframe.

(3) It is also important to make sure that the applicable airplane wiring is secure and correctly terminated. All shielded wiring in the affected airplane system should be properly terminated and grounded as shown in the applicable airplane routing chart. All shielded wiring in the HF system should be properly terminated and grounded as shown in the applicable airplane routing chart. All connectors and terminals in the affected airplane system and HF system should be checked to make sure that they are free of any corrosion and checked for proper pin and terminal nut tension.

(4) If the airplane is still experiencing excessive indicator fluctuations while transmitting on the HF after checking the above referenced items, it may be necessary to relocate/separate the HF system wiring from the affected airplane system wire routing throughout the airplane. It is advisable to keep the affected airplane system wiring isolated as much as possible from any coaxial cable carrying transmitting power (i.e. HF Comm, VHF Comm, Transponder, DME, etc.). As this can require extensive removal of interior furnishings to gain access to the wire bundles, it may be best to save this step until the airplane is in for a major inspection.

SINGLE/DUAL KING KHF-950 HF COMMUNICATIONS SYSTEM - REMOVAL/INSTALLATION

WARNING: DURING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, AND WATER, DRAIN, AIR CONDITIONING, AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

1. General

NOTE: When Removing/Installing any Panels/Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda procedures.

NOTE: The removal and installation of the equipment in this system is considered self evident therefore no instructions are detailed.

The King KHF-950 has the following equipment:

- KTR-953 HF Receiver/Exciter - two for dual installation.
- KA-594 Bus Adaptor - two for dual installation.
- KAC-952 HF Power Amplifier - two for dual installation.
- KFS-594 Miniature Controller - two for dual installation.
- KA-158 Bridging Amplifier - dual installation only - two installed.
- KA-161 Tuning Capacitor - single installation only.
- KA-162 Tuning Capacitor - dual installation only.

NOTE: The location of the above equipment, except the KFS-Controller, is shown in Chapter 34, NAVIGATION GENERAL.

NOTE: The location of the KFS-Controller is shown in Chapter 31, INSTRUMENTS GENERAL.

A. Preliminary Procedures

Open, safety and tag the following, relevant, circuit breakers before removing any of the King KHF-950 Communications System. Close the circuit breakers before doing the functional test.

Panel	Label
DA - A	HF R/T
DA - A	HF PA
DA - A	HF 1 R/T
DA - A	HF 1 PA
DA - A	HF 2 R/T
DA - A	HF 2 PA

2. Removal/Installation

A. Removal

(1) Locate and remove equipment as required.

B. Installation

(1) Install equipment removed at paragraph 2.A.(1).

3. Close Up

(1) Close the circuit breakers listed in 1.A.

(2) When any of the equipment, listed in paragraph 1, is removed a functional test of the HF system, as detailed in the AMM chapter 23 - HF COMMUNICATION SYSTEM (KHF-950) - ADJUSTMENT/TEST, must be done.

(3) Make sure the working area is clean and clear of all tools and miscellaneous equipment.

HONEYWELL TR-850 VHF COMMUNICATION SYSTEM - DESCRIPTION AND OPERATION

1. Description

NOTE: The location of equipment in this topic shows a typical installation. The location of equipment may vary on some airplanes. For location of equipment on a particular airplane refer to Chapter 31, INSTRUMENTS GENERAL and Chapter 34, AVIONICS GENERAL in the Maintenance Manual Addenda for the particular airplane.

A. General *(Figure 1)*

The Honeywell TR-850 VHF communication transceiver module and the transponder module are contained within the RCZ-851 integrated communication unit. The RCZ-851 is a part of the Honeywell Primus II Integrated Radio System. It provides two way communication on 760 channels in the frequency range 118.00 MHz to 137.00 MHz in 25 kHz increments.

Audio and push to talk facilities are provided by the audio integrating system.

The TR-850 VHF communication system includes the following:

- Two VHF transceivers.
- Two radio management units (RMU).
- One clearance delivery controller (CDC).
- Two VHF antennas.

The VHF system is a dual installation comprising VHF No. 1 and VHF No. 2. Each installation includes a transceiver module and an antenna.

The system uses an RM-850 RMU and a CDC for control and tuning. Selective calling (SELCAL) decoding equipment is connected to the system to provide audible and visual indication that a ground station is calling.

The transceiver module is installed in an integrated communications unit (ICU) that is a part of the integrated radio system. The antenna for VHF No. 1 is an integral part of the vertical stabilizer and the antenna for VHF No. 2 is installed on the underside of the airplane.

B. Transceiver

The transceiver is a microprocessor controlled unit that utilizes frequency synthesis to generate radio frequency signals. It comprises a synthesizer, a dual bandwidth receiver, a transmitter, a power supply and audio circuitry.

A resettable time out after two minutes of continuous transmission gives protection against a stuck microphone key. Internal heat sensors act to gradually reduce transmitter output power should a possible overheat condition exist.

The RMU controls the transceiver by way of the radio system bus (RSB). The transceiver may also be manually tuned from the flight management system (FMS) keyboard by way of the RMU and the RS-422 digital bus. CDC control of the transceiver is direct.

Comprehensive self test and internal monitoring status is retained in a nonvolatile maintenance log memory. This log can be recalled and reviewed by ground maintenance personnel on the RMU.

- Power on self test (POST) is initiated when power is first applied to the RMU.
- Pilot activated self test (PAST) does a preflight check of individual functions.

C. **Radio Management Unit (RMU)** *(Figure 1)*

The RMU is the central control for the integrated radio system. It utilizes a color screen display organized into pages. For ease of operation, the main page is divided into four dedicated windows. Each window groups the data associated with a particular function, i.e., communications, VHF navigation, transponder and ADF. Each window and its associated controls provide complete control of the frequency and operating mode of the related system.

Other display pages control additional features and functions of the system. A photosensor is provided to initially adjust digit brightness intensity.

Control and display features associated with the RMU-850 functions are discussed in Chapter 23, HONEYWELL RM-850 RADIO MANAGEMENT UNIT.

D. **Clearance Delivery Controller (CDC)** *(Figure 1)*

The CDC provides a control service for VHF No. 1 system only. It is used under the following circumstances:

- In an emergency if the primary RSB tuning is not available.
- If the pilot decides to override the RSB tuning.

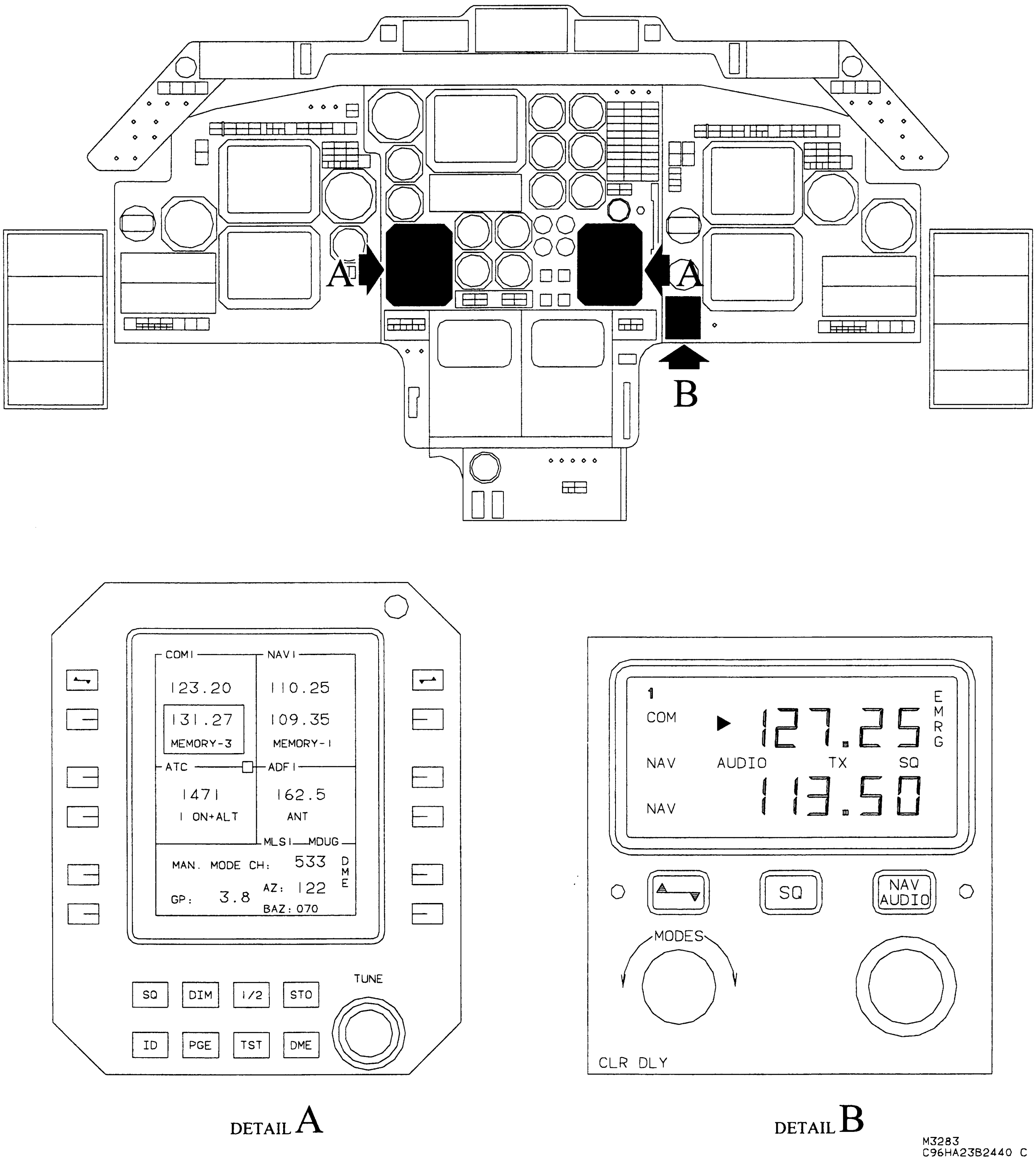
The CDC has two modes of operation, emergency and normal. These are selectable by a mode switch on the CDC. Controls and display features associated with the CDC VHF communications function are as follows:

System installation annunciator	Shows a 1 since the CDC can only affect VHF No. 1 system.
Tuning cursor	A lighted triangle which is controlled by the transfer key. It indicates which frequency can be changed by the tuning knobs.
Emergency mode annunciator	Legend EMRG is annunciated to show the CDC has been placed in the emergency mode. The RMU control is locked out and the CDC has exclusive control of VHF No. 1 system.
Transfer key	Alternately selects which frequency window is controlled by the tuning knobs.
Squelch ON/OFF	Alternate step push button switch which opens or closes receiver squelch.
Modes switch	Rotary control that selects either normal or emergency mode.

E. **Antennas** *(Figure 3)*

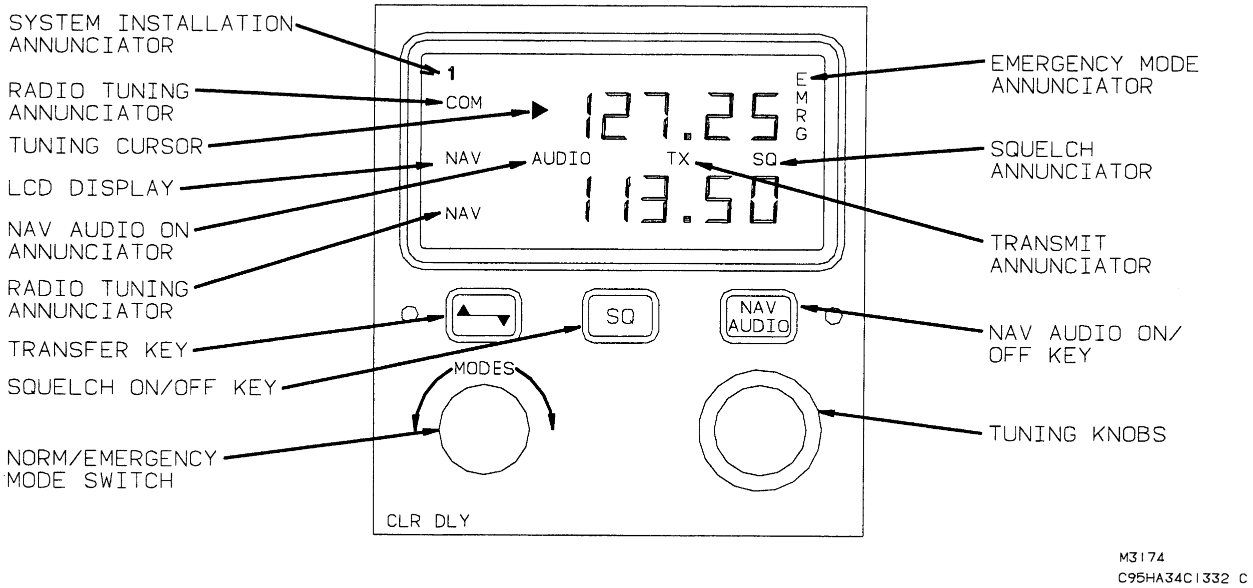
The VHF communication No. 1 antenna is an integral part of the vertical stabilizer. The antenna consists of metallic and nonmetallic components which behave like a sleeved unipole antenna at radio frequencies.

The VHF communication No. 2 antenna is mounted at the rear of the keel fairing under the wing. The antenna consists of a glass fiber reinforced polyester resin shell with a stainless steel top loading rod. The radiating elements are matched to 50 ohms by a network incorporated in the base of the mast. The antenna is terminated in a connector mounted on a base plate.



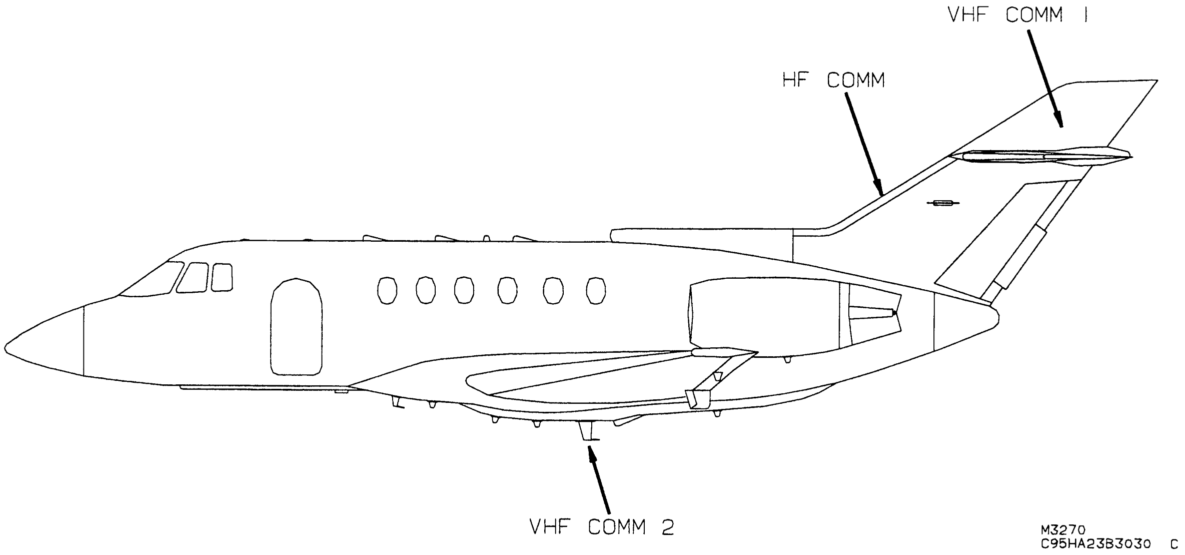
Communication Equipment Locator (typical installation)

Figure 1



Clearance Delivery Controller

Figure 2



Communication Antenna Locator (typical installation).

Figure 3

2. Operation

A. General

The COM window is located in the upper left portion of the RMU display. The window has two lines. The top line shows the active frequency in white and the bottom line shows either the memory frequency or scratch pad frequency in blue, depending on the last operation.

Pushing the line select key (LSK) adjacent to the lower line causes the cursor to enclose the frequency on that line, enabling it to be changed by the tuning knobs. When the frequency changes, the legend underneath the line changes from MEMORY X (X being a number from 1 to 12 inclusive) to TEMP X. The number now shows the memory in which the new frequency can be stored, if required. To store the frequency, the store (STO) key is pushed and the new frequency replaces any previously stored frequency at this location. The TEMP annunciation is now replaced by the MEMORY annunciation.

Pushing the transfer key (left side) causes the preset frequency and the active frequency to change places. The old preset frequency now becomes the active frequency and the VHF transceiver channels to this frequency. The old active frequency is not on the lower line and is annotated TEMP X. This may be stored in the numbered memory, amended by the tuning knobs, or left as a scratch pad memory frequency, available for instant recall by the transfer key.

Should the VHF system fail to respond to any command from the RMU, the frequencies or operating command annotations are replaced in the display window by dashes, indicating a malfunction.

B. Power On Self Test

On the ground only, the RMU initiates a POST (power on self test) when power is applied to the airplane, after it has been off for more than ten seconds.

The first RMU page shows POST IN PROGRESS, which features a clock showing the time remaining to test completion. The system automatically tests the RMU, the interface circuit card assemblies of the ICU, the RSBs and the VHF communication module. Simultaneous separate tests are conducted for each system side in a dual system.

If the POST detects errors, two separate test result pages are possible.

- The first page is the RMU/SYSTEM TEST RESULTS page, and with errors present the page is frozen and requires the TST key to be pressed to continue.
- The second page is the RADIO TEST RESULTS page and lists module faults.

Any module with a listed error message must have the PAST done to verify its serviceability. If the CDC is in emergency mode during POST, the error message AUX ON is generated and shown on the RADIO TEST RESULTS page.

C. Basic Tuning

After completion of the POST, the RMU shows the main tuning page with the configuration in use before the last shut down. Normally, the cursor is located in the COM window preset position. If not, push the LSK adjacent to the preset field. The tuning knobs can now be used to set a new preset or temporary frequency. Push the transfer key (left side) to exchange the preset and active frequencies and channel the system to the new frequency.

D. Direct Tuning

Direct tuning is initiated by pushing the preset frequency field LSK and holding it for more than three seconds. The cursor moves and encloses the active frequency field which may be changed by the tuning knobs. The preset frequency field goes blank.

To exit the direct tuning mode, push and hold the preset frequency field LSK until the preset frequency field data returns to the display.

E. Memory Tuning

With the main tuning page shown, any memory location enclosed by the cursor can be changed by tuning and storing a new frequency. When the new frequency is set, the identifying legend changes from MEMORY X to TEMP X and new frequency may be stored in MEMORY X location.

NOTE: If the TEMP X frequency is not stored, MEMORY X contents remain unchanged.

With the main tuning page shown, pushing the PGE once will access the first COM MEMORIES page. To gain access to the second MEMORIES page, the LSK adjacent to the MORE legend is pushed.

The COM MEMORIES pages may be used to change the active frequency using only two key strokes. Push the LSK adjacent to the required frequency. and then push the transfer key (left side). The frequency required now becomes the active frequency.

To add or change a frequency in the memory, push the LSK adjacent to the desired location. Now put in the new frequency using the tuning knobs.

NOTE: Memory locations must be loaded sequentially as blank locations are not permitted.

At the bottom of the COM MEMORIES pages are four annunciators. Their functions are as follows:

INSERT	To insert a new frequency in a particular location, push the LSK adjacent to the location in which the frequency is to be inserted. Then push the LSK beside the INSERT annunciator. All the data in memory shifts down one place from the cursor. A new frequency can now be tuned at the cursor location. *NOTE: If the INSERT LSK is pressed and all 12 memory locations are full, the INSERT legend is replaced by a MEM FULL (yellow) legend.*
DELETE	To delete a frequency from memory, push the LSK adjacent to the frequency not required which positions the cursor at that location. Then push the LSK beside the DELETE annunciator which deletes from memory the frequency enclosed in the cursor. The remainder of the frequencies move upward to fill the empty location.
MORE	When all the locations on page one are full, pushing the LSK, adjacent to the MORE annunciator, brings the MEMORIES page 2 into view. This is the same as the MEMORIES page 1 except the frequency storage locations are numbered 7 to 12 inclusive. Pushing the MORE LSK before all the memory locations on page 1 are full results in the INSERT legend being replaced by a CANT (yellow) legend. Page 1 remains in view.
RETURN	Pushing the LSK adjacent to the RETURN annunciator brings back the main tuning page.

F. COM Window Messages

The following messages display in the COM windows:

MIC STK	When the microphone has been continuously keyed for approximately two minutes, a bleep will sound on the audio and the message shows until the microphone is unkeyed. Ten seconds after the message is annunciated the transmitter is automatically deactivated.
AUX ON	Shows the CDU, in emergency mode, is controlling the VHF communications system.
TX	Shows the transceiver is transmitting.
SQ	Shows the receiver squelch is open.

G. Flight Management System Remote Tuning

The FMS computers are connected to their on side RMUs by an RS-422 digital bus, enabling control of operating modes and frequencies of the system radios. The FMS control display unit (CDU) operation includes a radio tuning page on which the radios can be manually channeled using the data entry keyboard.

After input on the CDU keyboard, system channeling data is removed from the screen after five seconds. It is necessary to verify correct channeling on the RMU COM window. Active frequencies tuned directly from the FMS CDU are displayed on the RMU in yellow instead of white. They remain in yellow until the RMU tunes the transceiver.

FMS manual tuning can be inhibited. To do this access the NAV MEMORIES page by pushing the PGE key twice. Adjacent to the transfer key (right side) a legend FMS DISABLE or FMS ENABLE is annunciated in yellow. Pushing the transfer key (right side) causes the legend to alternate between FMS DISABLE or FMS ENABLE.

With the CDC in emergency mode or the FMS manual tuning disabled, any attempt to manually tune from the FMS keyboard causes the FMS CDU to display a message UNABLE TUNE REQUEST.

H. Cross Side Operation

Each RMU normally controls the radio system on the same side of the airplane but may be switched to display and control the cross side systems by operation of the 1/2 key.

Should the pilot need to control the copilot's system, pushing the left side RMU 1/2 key transfers control of the copilot's system to the pilot's RMU. Both RMU displays are now identical except the pilot's RMU function legends show in magenta, indicating that cross side control is in operation.

Memory contents and memory display are not transferred, but the pilot may access stored frequencies to tune the copilot's system. The pilot can change any frequency on the copilot's VHF communication system. Changed frequencies on the pilot's RMU show in white and on the copilot's RMU show in yellow. Pushing the pilot's RMU 1/2 key restores the pilot's RMU to its original state.

Both RMUs have this cross side operation available, but operation shifts between complete systems. It is not possible to show or control on RMU some functions from the pilot's and some from the copilot's side at the same time.

I. Clearance Delivery Controller

With the airplane on the ground and weight on wheels, application of power causes the CDC to do a power on self test (POST). The test consists of the following:

(1) Saving the frequencies that the VHF COM No. 1 and VHF No. 1 systems are tuned to, as indicated by the RSB.

(2) Changing the frequency outputs to the systems and verifying that they have changed on the RSB.

(3) Changing the frequency outputs back to the original ones and verifying again that they are correct on the RSB.

During the POST, error code 13 shows on the CDC. This shows that the VHF COM No. 1, and VHF NAV No. 1 systems are not powered up and cannot reply on the RSB.

A POST failure is annunciated on the display and shows ERXX, the XX being the two digit error code. The error message shows on the frequency display line associated with the failed system. The error message clears when any key is pressed or control turned. Normal operation continues if possible.

In the normal mode, the COM tuning annunciator shows on the display adjacent to the VHF communications frequency field. To change the frequency, the tuning cursor should be adjacent to the frequency field (push the transfer key if required), and then the tuning knobs are used to set the required frequency. Frequency annunciation on the left side RMU is in yellow.

Receiver squelch is opened and closed using the SQ key. When squelch is open, the SQ annunciator shows at the right side of the CDC display.

In the emergency mode, the annunciation EMERG shows at the right side of the CDC display. This mode operates in the same way as the normal mode except that any control of frequency annunciation on the left side RMU is inhibited.The annunciation AUX ON shows in the COM window of the main tuning page. FMS manual tuning is also inhibited in this mode.

J. Maintenance mode

The maintenance mode is accessible only when on the ground by simultaneously pushing both RMU transfer keys. In the maintenance mode, various pages are available giving access to the maintenance log data, software versions, strap option settings, and operating parameters and conditions. Use the LSK to select the COM menu from which the COM module and maintenance log are available.

NOTE: In the maintenance mode, parameters may only be examined; they cannot be amended in any way.

K. Self Test

A self test can be initiated and done on the RMU. To do a self test, the CDC must be in the normal mode, with the AUX ON annunciator not shown on the RMU.

To initiate self test, position the cursor on the COM window. Push and hold the TST key for more than two seconds. While the TST key is held, TEST is annunciated in the COM window, followed by COM TEST which shows that the test is in progress.

Upon completion of the self test, the words COM PASS (in green) or COM ERR (in red) show in the COM window.

HONEYWELL TR-850 VHF COMMUNICATION SYSTEM REMOVAL/INSTALLATION

WARNING: DURING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, AND WATER, DRAIN, AIR CONDITIONING AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE MANUAL PROCEDURES.

CAUTION: WHEN REMOVING THE TRANSCEIVER, DO NOT LIFT OR APPLY ANY SIDE FORCE UNTIL THE REAR RACK CONNECTOR IS FULLY DISENGAGED OR DAMAGE TO THE CONNECTOR MAY RESULT.

1. General

The TR-850 VHF communication system includes the following:

- Two VHF transceivers
- Two radio management units (RMU).
- One clearance delivery controller (CDC).
- Two VHF antennas.

NOTE: The removal and installation of the above listed equipment is considered self evident therefore no instructions are detailed.

NOTE: The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 31-00-00, INSTRUMENTS GENERAL and Chapter 34-00-00, AVIONICS GENERAL in the Maintenance Manual Addenda for the particular airplane.

NOTE: When Removing/Installing any Panels/Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda procedures.

A. Equipment/Material

Equipment/Material	Part/Item No.
Circuit breaker safety clips	Operator supplied
Circuit breaker tags	Operator supplied
Protective caps	Operator supplied

B. Preliminary Procedures

(1) Open, safety, and tag the following circuit breakers..

Panel	Label
DA-A	COMM 1
DA-A	COMM 2

C. Removal/Installation

(1) Remove/install equipment as required.

D. Close up

(1) Close circuit breakers opened at paragraph 1.B (1).

(2) Do an operational test of the TR-850 VHF system after removal/installation of any components.

(3) Make sure the working area is clean and clear of all tools and miscellaneous equipment.

HONEYWELL TR-850 VHF COMMUNICATION SYSTEM ADJUSTMENT/TEST

1. Adjustment/Test

NOTE: *When using any test set/equipment, use in accordance with the test set manufacturers instructions.*

NOTE: *When operating any other systems referred to in this procedure, make sure ALL operations are done in accordance with the instructions in the relevant AMM Chapter.*

A. Equipment/Material

Equipment/Material	Part/Item No.
Two Headsets	Operator supplied

B. Preliminary procedures

(1) Energize the airplane busbars (AMM Chapter 24, GENERAL).

(2) On the overhead panel push the LTS MASTER switch, the ON annunciator comes on.

(3) Set the Radio 1 and Radio 2 switches to on. The OFF legends go off and ON legends come on.

C. Operational Test

ACTION		RESULT
RMU/CDC Panel Lighting		
(1) With the LTS MASTER switch on, turn the radio dimmer control (on the center instrument panel) clockwise and counterclockwise.	...	a) Both RMUs integral lighting varies in accordance with the control movement. b) The CDC integral lighting and display lighting varies in accordance with control movement.
(2) Adjust the dimmer control to set the RMU and CDC lighting to suit the ambient conditions.	...	-
Power On Self Test (POST)		
(3) Set the RADIO 1 and RADIO 2 switches to on.	...	OFF legends go off and ON legends come on.

ACTION		RESULT
(4) On the right console set the CDC MODES switch to the normal mode.	...	EMERG annunciator is not in view.
(5) On the left RMU push the DIM key.	...	TUNE TO DIM DISPLAY shows on the RMU.
(6) Turn the TUNE knob clockwise and counterclockwise.	...	The brightness of the RMU display varies in accordance with the control movement.
(7) Adjust the RMU brightness to suit the ambient conditions.	...	-
(8) Push the DIM key again.	...	Main tuning pages show on the RMU.
(9) Repeat steps 4 through 7 for the right RMU.	...	Same results as steps 4 through 7.
(10) Push the RADIO 1 and 2 switches.	...	OFF legends go off and ON legends come on.

NOTE: Wait at least 10 seconds before proceeding with the test. Observe the RMUs as soon as power is switched on again.

Pilot-Activated Self-Test (PAST)

(11) Set the RADIO 1 and RADIO 2 switches to on.	...	a) The OFF legends go off and 1 and 2 ON legends come on. On the RMUs:- b) The TEST IN PROGRESS page comes into view. The clock shows time to test completion. c) On successful completion of the test the main tuning page shows on the RMUs.

NOTE: Any navigation system (DME, ATC, VHF, or ADF) not powered up when POST is initiated will cause the generation of an error message.

(12) On the left RMU push the line select key (LSK) adjust to the COM 1 window.	...	The cursor box is in the COM 1 window.
(13) On the left RMU push and hold the TST key.	...	a) The word TEST comes into view in the COM 1 window. b) The word TEST is replaced by COM TEST. c) The words COM TEST are replaced by the words COM PASS in green. This shows successful completion of the test.
(14) Release the TST key.	...	On left RMU the main tuning page comes into view.
(15) Repeat steps 11 through 13 on the right RMU.	...	Same results as steps 11 through 13 for the right RMU.

D. Functional Test Procedures

ACTION	RESULT
(1) Connect a headset to both the pilot's and copilot's HEADSET sockets.	-
(2) On the pilot's audio select panel (ASP) do the following: a) Push the COM 1 microphone switch. b) Push (out) the COM 1 and ST volume controls and set to their mid position. c) Set the SPEAKER and HEADPHONE volume controls to their mid position.	The green light on the COM 1 microphone switch comes on.
(3) On the copilot's SELECT PANEL do the following: a) Push the COM 2 microphone switch. b) Push (out) the COM 2 and ST volume controls and set to their mid position. c) Set the SPEAKER and HEADPHONE volume controls to their mid-position.	The green light on the COM 2 microphone switch comes on.
(4) On the left RMU push the LSK adjacent to the COM 1 window.	The cursor box is in the COM 1 window.
(5) On the left RMU set a VHF frequency using the tuning knobs.	The selected frequency shows in the cursor box.
(6) On the left RMU push the transfer key (left side).	The preset frequency in the cursor box changes places with the active frequency.
(7) On the left RMU push the SQ key.	a) The SQ annunciator shows in the COM 1 window. b) Noise can be heard in the pilot's headset and speaker. (Adjust the volume controls as necessary.)
(8) On the left RMU push the SQ key again.	a) The SQ annunciator goes out of view. b) The noise in the pilot's headset and speaker ceases.
(9) Repeat steps 4 through 8 for the right side RMU.	The results are on the right side RMU and the copilot's headset and speaker.
(10) On the pilot's and copilot's ASP do the following: a) Push (in) the COM 1 and 2, and ST volume controls. b) Make sure the MASK/MIC switch is pushed (in).	-

ACTION	RESULT
(11) On the left RMU push the LSK adjacent to the COM 1 window.	The cursor box is in the COM 1 window.
(12) Select the frequency of a local test channel.	The frequency shows in the cursor box.
(13) On the left RMU push the transfer key (left side).	The selected frequency now becomes the active frequency.
(14) Monitor the selected channel to make sure it is not in use.	-
(15) On the pilot's control wheel push and hold the INTER MIC switch to MIC.	The annunciator TX shows in the COM 1 window of the left side RMU.
(16) Make a test transmission to the ground station.	Sidetone is present only in the pilot's headset and received audio is clear and distortion free.
(17) Release the INTER MIC switch.	The TX annunciator goes out of view.
(18) Repeat steps 11 through 17 on the right side RMU and the copilot's control wheel.	Results show on the right side RMU and audio is heard on the co-pilot's headset.
(19) On the pilot's and copilot's ASP push (out) ST volume control and set to its mid position.	-
(20) Repeat steps 14 through 18 but use the hand held microphones.	Same results as before but sidetone and audio are heard on the relative cockpit speaker. The ST volume control can adjust the sidetone but not the received audio.
(21) On the pilot's and copilot's ASP push (out) the MIC/MASK volume control.	-
(22) Repeat steps 14 through 18 but talk into the oxygen mask.	Same results as before but the sidetone from the cockpit speakers can only be adjusted by the SPEAKER volume control.
(23) On the pilot's and copilot's ASP push (in) the ST and MIC/MASK volume controls.	-
(24) On both RMUs push the transfer key (left side).	The active and preset frequency fields exchange data.

ACTION	RESULT
(25) On the left RMU push the COM 1 window LSK and hold for more than three seconds.	The cursor box moves to the active frequency field and the preset frequency field blanks.
(26) Use the tuning controls to change the active frequency field.	The active frequency field changes in accordance with the tuning controls.
(27) Push and hold the COM 1 window LSK for more than three seconds.	The COM 1 window reverts to its active and preset frequency fields with the cursor box in the preset frequency field.
(28) Repeat steps 25 through 27 on the right RMU.	Same results as steps 25 through 27 on right RMU.
(29) On the left RMU push the PGE key once.	First memory page shows on the RMU.
(30) Push the transfer key (right key).	The bandwidth changes from NARROW to WIDE.
(31) Push the transfer key (right key) again.	The bandwidth changes back to NARROW.
(32) Push the LSK adjacent to the RETURN legend.	The main tuning page comes into view.
(33) Repeat steps 29 through 32 for the right RMU.	Results are on the right RMU.
(34) On the left RMU push the PGE key once.	The first memory page shows on the RMU.
(35) Make sure the memory fields 1 through 3 have a frequency inserted.	-
(36) Push the LSK adjacent to field 2.	The cursor box moves to field 2.
(37) Push the LSK adjacent to the INSERT legend.	a) The frequencies in fields 2 and 3 move to fields 3 and 4 respectively. b) Field 2 frequency defaults to 118.00.
(38) Use the tuning knobs to insert a new frequency in field 2.	-
(39) Push the LSK adjacent to field 6.	The legend CANT replaces the legend INSERT.
(40) Push the LSK adjacent to field 5.	a) Cursor box shows in field 5. b) The legend INSERT replaces the legend CANT.

ACTION	RESULT
(41) Push the LSK adjacent to the MORE legend.	The legend CANT replaces the legend INSERT.
(42) Push the LSK adjacent to field 5.	The legend INSERT replaces the legend CANT.
(43) Insert the frequency in fields 5 and 6.	-
(44) Push the LSK adjacent to MORE legend.	Second memory page shows on the legend CANT.
(45) Insert frequencies in fields 7 through 12.	-
(46) Push the LSK adjacent to the INSERT legend.	The legend MEM FULL replaces the INSERT legend.
(47) Push the LSK adjacent to field 12.	a) Cursor box moves to field 12. b) The legend INSERT replaces the MEM FULL legend.
(48) Push the LSK adjacent to the DELETE key.	The frequency in field 12 goes out of view.
(49) Repeat step 48 for fields 7 to 11.	-
(50) Push the LSK adjacent to the RETURN LEGEND.	The main tuning page comes into view.
(51) Repeat steps 34 through 50 for the right RMU.	Results are on the right RMU.
(52) On the left RMU, push the 1/2 key.	The left RMU shows identical data to the right RMU, but the function legends on the left RMU are magenta and the active and preset frequencies are yellow.
(53) On the left RMU, change the frequency in the cursor box.	-
(54) Push the transfer key (left side).	a) On the left RMU, the new active frequency shows in white. b) On right RMU, the new active frequency shows in yellow.
(55) On the left RMU, push the 1/2 key.	Both RMU displays revert to their normal main tuning pages with the right active and preset frequencies in yellow.
(56) Repeat steps 52 through 55 on the right RMU.	Same results as 52 through 55 for right RMU.

ACTION		RESULT
(57) On the left RMU, push the PGE key twice.	...	The NAV 1 MEMORIES page comes into view.
(58) Push the transfer key (right) as necessary.	...	The FMS ENABLED legend comes into view.
(59) Push the LSK adjacent to the RETURN legend.	...	The main tuning page comes into view.
(60) Switch on and initialize both FMS systems.	...	-
(61) On the left FMS control display unit (CDU) keyboard, access the radio tuning page and input a valid VHF communications frequency.	...	a) The new active frequency shows in the COM 1 window in yellow. b) After approximately five seconds the COM tuning data is removed from the FMS radio tuning page.
(62) On the left RMU push the PGE key twice.	...	The NAV MEMORIES page comes into view.
(63) Push the transfer key (right).	...	The FMS DISABLED legend shows in the NAV window.
(64) Push the LSK adjacent to the RETURN legend.	...	The main tuning page comes into view.
(65) On the left FMS CDU keyboard, access the radio tuning page and input a new VHF communications frequency.	...	a) The COM 1 window active frequency does not change. b) The FMS radio tuning page shows the message UNABLE TUNE REQUEST.
(66) Repeat steps 57 through 65 for the right RMU and FMS CDU.	...	Same results as 57 through 65 for right RMU and FMS CDU.
(67) On the CDU, push the transfer key if required.	...	The tuning cursor is adjacent to the COM annunciator.
(68) On the MODES switch, select the normal mode.	...	The EMERG annunciator is not in view.
(69) Push the SQ key, if required.	...	The SQ annunciator is not in view.
(70) Make sure the correct installation annunciator is in view.	...	The digit 1 shows above the COM annunciator.

ACTION		RESULT
(71) Use the CDC tuning knobs to set the frequency of a VHF communications channel.	...	a) The COM frequency on the CDC shows the selected frequency. b) On the left RMU the active frequency shows the newly selected frequency in yellow.
(72) On the copilot's ASP, push the COM 1 microphone switch.	...	The green light on the COM 1 microphone switch comes on and that on the COM 2 switch goes off.
(73) On the pilot's ASP, push (out) the COM 1 and 2 volume controls and set them to their mid-position.	...	-
(74) On the CDC, push the SQ key.	...	a) On the left side RMU and the CDC the SQ annunciator shows. b) A noise is heard in the pilot and copilot headsets.
(75) On the CDC, push the SQ key.	...	a) The SQ annunciator goes out of view. b) The noise ceases.
(76) On the CDC use the tuning knobs to set the frequency of a local test channel.	...	The frequency shows on the CDC and left RMU. (ON the RMU its color is yellow).
(77) Monitor the selected channel to make sure it is not in use.	...	-
(78) On the pilot's control wheel push and hold the INTER/MIC switch to MIC.	...	On the left RMU and the CDC the TX annunciator shows.
(79) Make a test transmission to the ground station.	...	Sidetone is present in the pilot's and copilot's headsets and received audio is clear and distortion free.
(80) Release the INTER/MIC switch.	...	The TX annunciator goes out of view on the left side RMU and the CDC.
(81) On the CDC, select the MODES switch to the emergency mode.	...	a) On the CDC the EMERG annunciator shows. b) On the left RMU the AUX ON annunciator shows in the COM 1 and NAV 1 windows.

ACTION	RESULT
(82) On the left RMU, push and hold, for at least three seconds, the LSK adjacent to the COM 1 window.	The cursor box does not move to the active frequency display.
(83) On the left RMU, turn the tuning knobs.	The active frequency display does not change.
(84) On the CDC, select the MODES switch to NORMAL.	-

E. Close Up

(1) On the pilot's and copilot's ASP:

  (a) Deselect all the microphone switches.

  (b) Push (in) all the volume controls.

  (c) Turn all volume controls fully counterclockwise.

(2) On the overhead panel, push the LTS MASTER switch.

(3) Set the RADIO 1 and RADIO 2 switches to off. The ON legends go off and the OFF legends come on).

(4) Disconnect the headsets and remove from the airplane.

(5) De-energize the airplane busbars (AMM Chapter 24, GENERAL).

(6) Make sure the working area is clean and clear of all tools and miscellaneous equipment.

GLOBAL WULFSBERG FLITEFONE VI- DESCRIPTION AND OPERATION

1. Description *(Figure 1)*

A. General

The Flitefone VI system is designed for use in the Air Ground Radiotelephone Automated System (AGRAS), and is compatible with the existing manual air to ground communication systems. AGRAS provides for the direct dial (D/Dial) call placement similar to the business office phone. The radio telephone system includes the following components:

- One RT-18D transceiver.
- Two WH-10 handsets.

Two phones are installed.

- The cockpit phone - normally vertically mounted behind the copilot's seat.
- The cabin phone - normally mounted in the forward armrest of the divan.

NOTE: *The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 34, AVIONICS GENERAL in the Maintenance Manual Addenda for that particular airplane.*

2. Operation

A. General

The Flitefone VI is controlled with the WH-10 handset.

B. Component Description

(1) Control Unit HF PHONE Switch

An HF PHONE switch is installed on the base of the cabin phone. This switch must be in the HF position to interface with the HF radio system. Before use, the pilot must channel up the HF radio to a proper frequency.

(2) Hookswitch

The hookswitch puts the system in the standby mode when the handset is 'on hook'. All handsets must be 'on hook' for the system to be on standby. The control unit has a hookswitch on the base and another in the handset.

(3) Volume Control

The volume control adjusts the volume of the handset communications. One-third of full is a satisfactory initial position.

(4) PTT Switch

The PTT switch on the handset is used to transmit over communication systems such as an HF system.

(5) Intercom

The intercom may be activated on the control unit by pushing 4, 2, #. The yellow IC LED, located in the base of the control unit, comes on when the system is in the intercom mode and when all the system handsets are 'on hook' and a call is not being processed.

(6) Transmit

The transmitter may be turned on and the operator alert tone activated by pushing the 8, 9, and # keys on the control unit. The transmitter cannot be turned on when a busy AGRAS station is selected or when a channel has not been selected.

The green TX LED, located in the base of the control unit, lights when the transmitter is on. When the AGRAS messages are exchanged, the TX LED flashes on and off.

(7) Key Functions

Use keys 0 through 9 to select the channels and enter the telephone numbers.

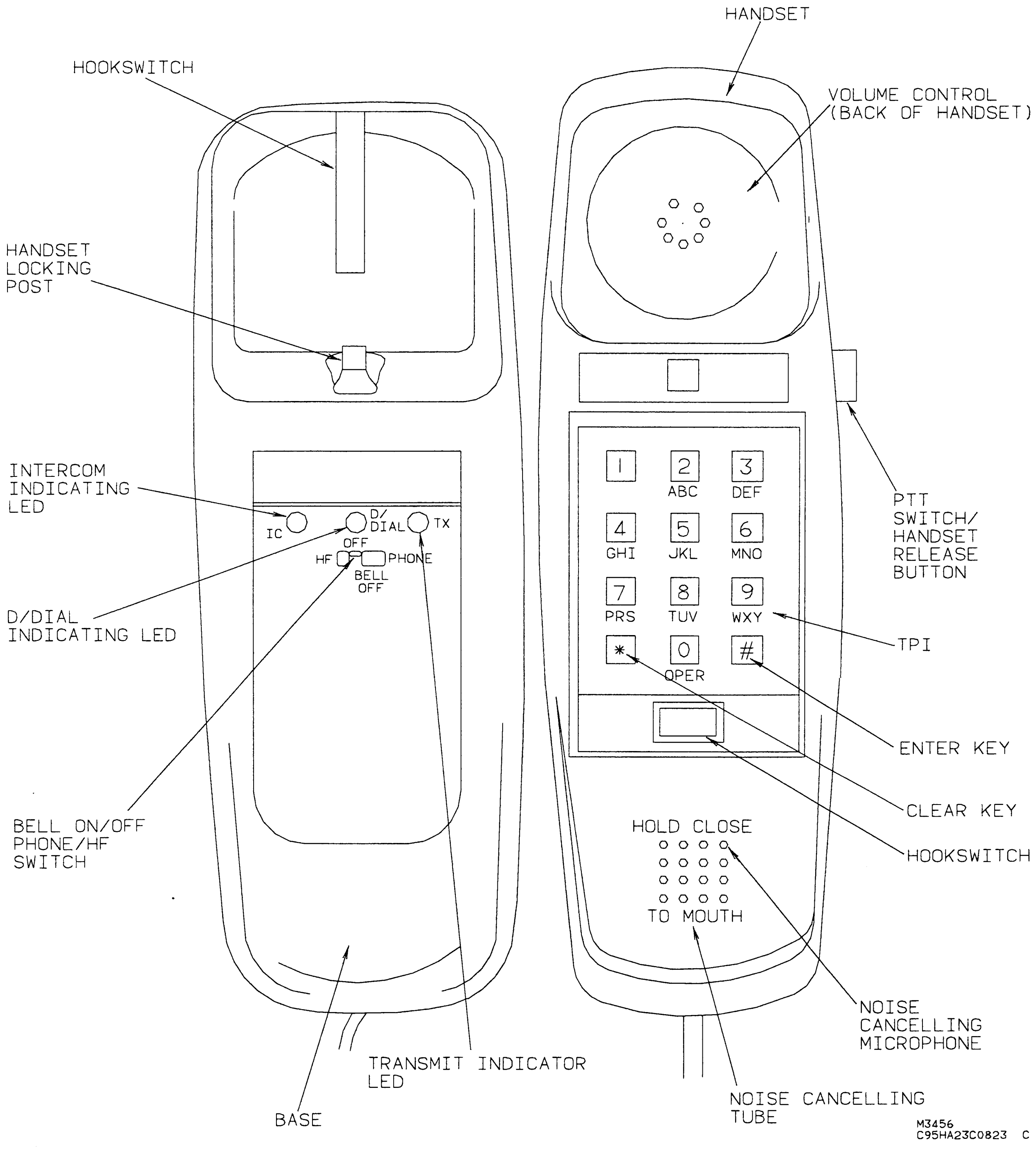
Use the * key to activate or deactivate the queue feature. It can also be used as a clear key to correct number entry errors.

Use the # key to redial the last number dialed since the unit was turned on. It can also be used as an enter key to expedite the processing of international telephone numbers or channel numbers. If the # key is not pushed, the channel entered or number dialed will be processed after a short delay.

The key sequence 4, 2, #, on the control unit, activates the intercom and rings the bells in the receiving unit.

(8) D/Dial Lamp

The D/Dial Lamp indicates that a station with direct dial service has been selected.



Air to Ground Telephone

Figure 1

GLOBAL WULFSBERG FLITEFONE VI - REMOVAL/INSTALLATION

WARNING: DURING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, WATER, DRAIN, AIR CONDITIONING, AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

1. General

A. Preliminary Procedures

(1) Open, safety, and tag the following circuit breaker.

Panel	Label
DA-A	FLITEFONE

NOTE: The removal and installation of the RT-18DVP Transceiver is considered self evident therefore no instructions are detailed.

NOTE: The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 34, AVIONICS GENERAL in the Maintenance Manual Addenda for the particular airplane.

NOTE: When Removing/Installing any Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda procedures.

NOTE: Information qouted in paragraph 1. General and paragraph 4. Close up is applicable to the Removal/Installation of ALL equipment in this system.

2. Cockpit Handset *(Figure 401)*

A. Removal

(1) Move the copilot's seat forward to access the cockpit phone.

(2) Disconnect the phone lead from the handset.

(3) Carefully pry the plastic tab from the handset cradle to access the cradle attach screws.

(4) Remove the screws attaching the handset cradle to the phone base unit.

(5) Remove the screws attaching the base unit to the bulkhead.

(6) Disconnect the wiring to the base unit.

(7) Remove the phone assembly.

B. Installation

(1) Move the copilot's seat forward to access the bulkhead behind the seat.

(2) Connect the wiring to the base unit.

(3) Install the phone base unit on the bulkhead.

(4) Install the handset cradle to the base unit.

(5) Place the plastic tab over the screws in handset cradle.

(6) Connect the phone lead to the handset.

(7) Move the copilot's seat to the correct position.

3. Cabin Handset *(Figure 402)*

A. Removal

(1) Gain access to the phone by pulling out the drawer in the divan forward armrest.

(2) Disconnect the phone lead from the handset.

(3) Carefully pry the plastic tab from the handset cradle to access the cradle attach screws.

(4) Remove the screws attaching the handset cradle to the phone base unit.

(5) Remove the screws attaching the base unit to the drawer shelf.

(6) Disconnect the wiring from the base unit.

(7) Remove the phone assembly.

B. Installation

(1) Pull out the drawer in the divan forward armrest.

(2) Connect the wiring to the phone base unit.

(3) Install the base unit on the drawer shelf.

(4) Install the handset cradle to the base unit.

(5) Place the plastic tab over the screws in the handset cradle.

(6) Connect the phone lead to the handset.

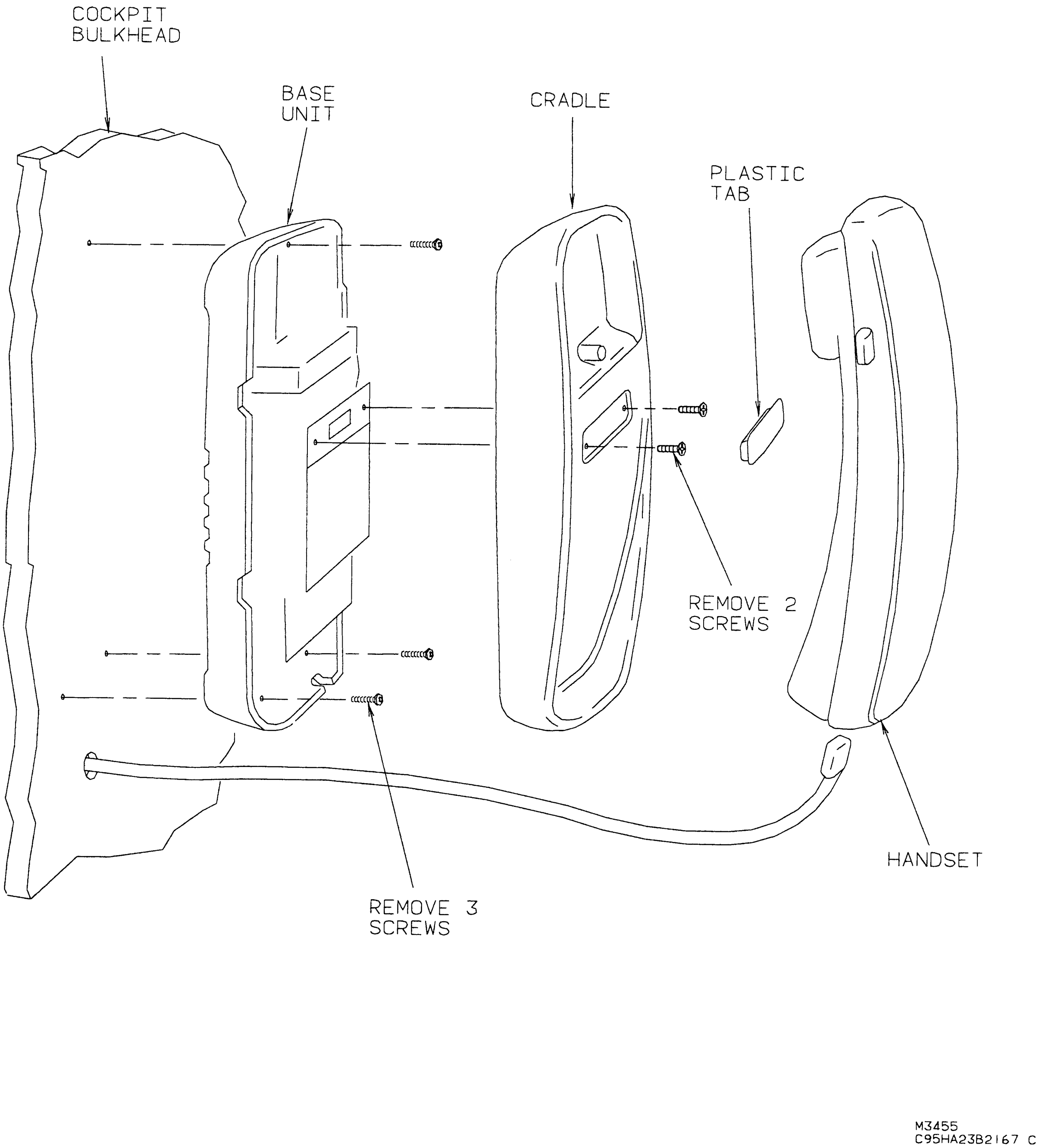
4. Close Up

A. Final Procedures

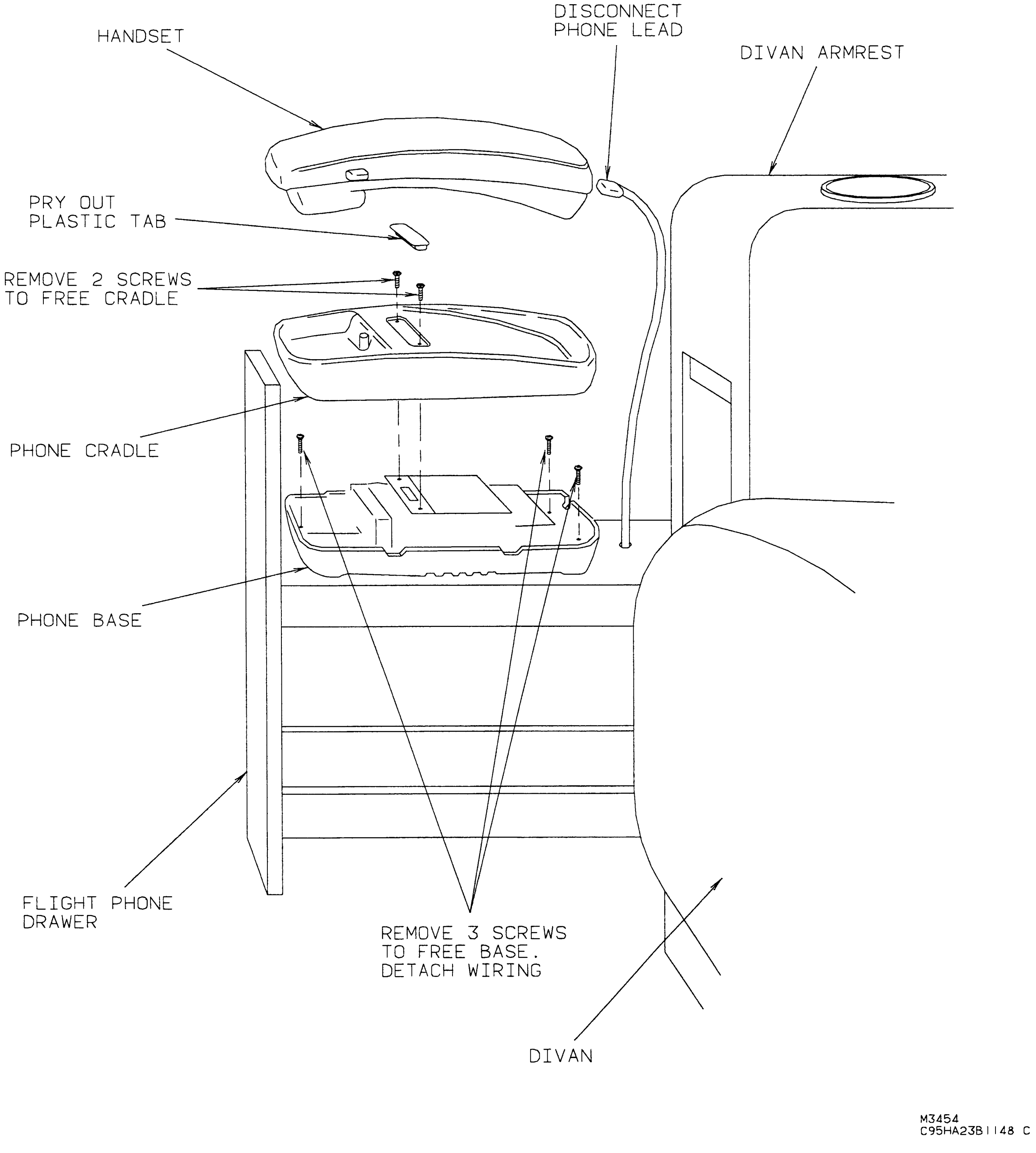
(1) Close the opened circuit breakers.

(2) Do an operational test of the Flitefone system (MMA - ADJUSTMENT/TEST).

(3) Make sure the working area is clean and clear of all tools and miscellaneous equipment.



Cockpit Handset
Figure 401



Cabin Handset

Figure 402

GLOBAL WULFSBERG FLITEFONE VI- ADJUSTMENT/TEST

1. Adjustment/Test

NOTE: *When operating any other systems referred to in this procedure, make sure ALL operations are done in accordance with the instructions in the relevant AMM or MMA.*

A. Operational Test Procedures

ACTION	RESULT
(1) Energize the airplane busbars (Chapter 24, GENERAL).	-
(2) Lift the handset on the cabin control unit.	Standard dial tone is audible. The following alternate tones may be heard: • Continuous high pitched tone indicates a manual AGRAS station is selected. • Pulsed dial tone indicates a busy AGRAS station with queuing facility is selected. • Standard busy tone or voice announcement indicates the station is busy or no stations are available.
(3) Make a test call:	
Key in the area code + phone number + billing code.	While AGRAS data is exchanged the TX indicator flashes.
(4) During test call:	
Request a report on the transmission quality.	-
(5) Request a return test call, and replace the handset securely.	TheTX indicator goes off. On receipt of the test call, make sure the chime sounds and the cabin PHONE annunciator on the flight deck comes on.
(6) Lift the handset.	The TX indicators come on.
(7) Announce the telephone number and city of registration.	
Acknowledge the test call.	-

	ACTION	RESULT
(8)	Check the sound clarity and volume.	Adjust the volume to the desired level.
(9)	Replace the handset.	Make sure the indicators go off.
(10)	Repeat steps 2 through 9 for the cockpit control unit.	-
(11)	Slide the HF PHONE switch, on the control unit base, to HF.	
	Make sure the cockpit HF switch is in the on position (if installed).	
	Have the pilot channel up the HF radio to the proper frequency.	-
(12)	Make a test call on an HF channel.	-
(13)	During the test call:	
	Request a report on the transmission quality.	-
(14)	Request a return test call, and replace the handset securely.	The TX indicator goes off. On receipt of the test call make sure the chime sounds and the cabin PHONE annunciator, on the flight deck, goes off.
(15)	Lift the handset.	The TX indicators come on.
(16)	Announce the telephone number and city of registration.	
	Acknowledge the test call.	-
(17)	Check the sound clarity and volume.	Adjust the volume to the desired level.
(18)	Replace the handset.	Make sure the indicators go off.
(19)	Repeat steps 2 through 10 for the cockpit control unit.	-
(20)	Switch the radio telephone system off.	-
(21)	De-energize the airplane busbars (Chapter 24, GENERAL).	-

COLTECH SELCAL DECODER - DESCRIPTION AND OPERATION

1. Description

A. General

The Coltech SELCAL decoder is a rack mounted 16 tone decoder for the ICAO and ARINC standard SELCAL system. The decoder is mounted in the aft avionics bay. The decoder installed in this aircraft is a two channel version. The system has inputs for two radios to drive the two decoder channels. The system is connected to the VHF and HF receivers and monitors audio inputs for SELCAL tone codes. Receiving the code for which the system is programmed will cause activation of the crew annunciators and chime.

The individual code assignment to the aircraft is programmed by grounding pins in the rear connector of the unit or by a code selector panel. There are output lines to control the annunciation of a decoder call. The lines activate lights to indicate which radio system received the call and to activate a chime in the audio system.

2. Operation

NOTE: *Figure 1 shows a typical instrument panel layout and may not be representative of the operator's configuration. For the customized instrument panel layout, refer to the relevant Aircraft Supplement.*

A. Normal Operation

The operation by the crew is limited to resetting the system after a call is received and performing a SELCAL self test. When an encoded call is received, the SEL 1 or SEL 2 annunciator on the copilot's instrument panel will light and the chime (hi-low) will sound. The appropriate radio is selected by using the HF 1/VHF 1 or HF 2/VHF 2 switches (if installed) on the center pedestal. The SELCAL encoder is reset by pushing the SEL 1/SEL 2 button.

B. Power On Self Test

(1) The SELCAL decoder performs a self test whenever power is applied to the unit.

(2) There will be no indications unless an error is detected.

(3) If the code selection programmed into the unit is not valid, all annunciators will flash and the chime will sound. The system cannot be reset. The unit will require maintenance.

C. Manual Self Test

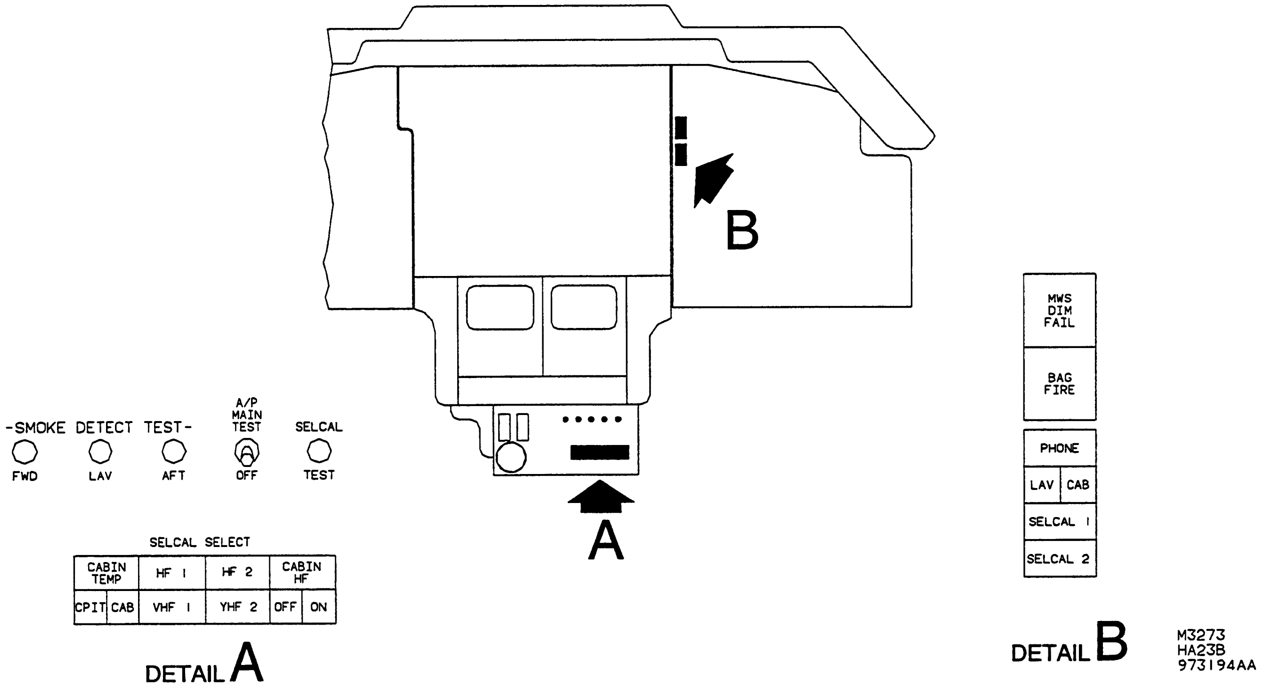
(1) Push and release the SELCAL TEST button to do the internal test of the system.

(2) The self test requires approximately four seconds to complete.

(3) The self test is successful if the SELCAL annunciators indicate that a call has been received on all channels.

(4) If all channels do not test correctly, the annunciator light for the failed channel will not come on.

(5) If the code selection programmed into the unit is not correct, none of the annunciators will come on.



SELCAL annunciators and TEST button - typical

Figure 1

COLTECH SELCAL DECODER - REMOVAL/INSTALLATION

WARNING: DURING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, AND WATER, DRAIN, AIR CONDITIONING, AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

1. General

NOTE: The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 31-00-00, INSTRUMENTS GENERAL and Chapter 34-00-00, AVIONICS GENERAL in the Maintenance Manual Addenda for the particular airplane.

NOTE: When Removing/Installing any Panels/Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda procedures.

A. Equipment/Material

Equipment/Material	Part/Item No.
Circuit breaker safety clips	Operator supplied
Circuit breaker tags	Operator supplied

B. Preliminary Procedures

(1) Open, safety, and tag the following circuit breakers.

Panel	Label
DA-A	SELCAL

2. Decoder

CAUTION: DO NOT LIFT OR APPLY SIDE FORCE TO THE DECODER UNTIL THE REAR MOUNT CONNECTOR IS FULLY DISENGAGED.

NOTE: Figure 401 shows the typical decoder location but may not be representative of the operator's configuration. For the customized layout, refer to Chapter 34, AVIONICS GENERAL.

A. Removal

(1) Access decoder unit under LH floor. (Chapter 25 - EQUIPMENT/FURNISHINGS, AFT BAGGAGE COMPARTMENT).

(2) Remove the decoder from its tray

3. Installation

CAUTION: MAKE SURE THAT THE LOCATION PINS ARE PROPERLY ALIGNED TO AVOID DAMAGING THE CONNECTOR.

A. SELCAL Decoder Installation

(1) Install the decoder into its mounting tray - secure

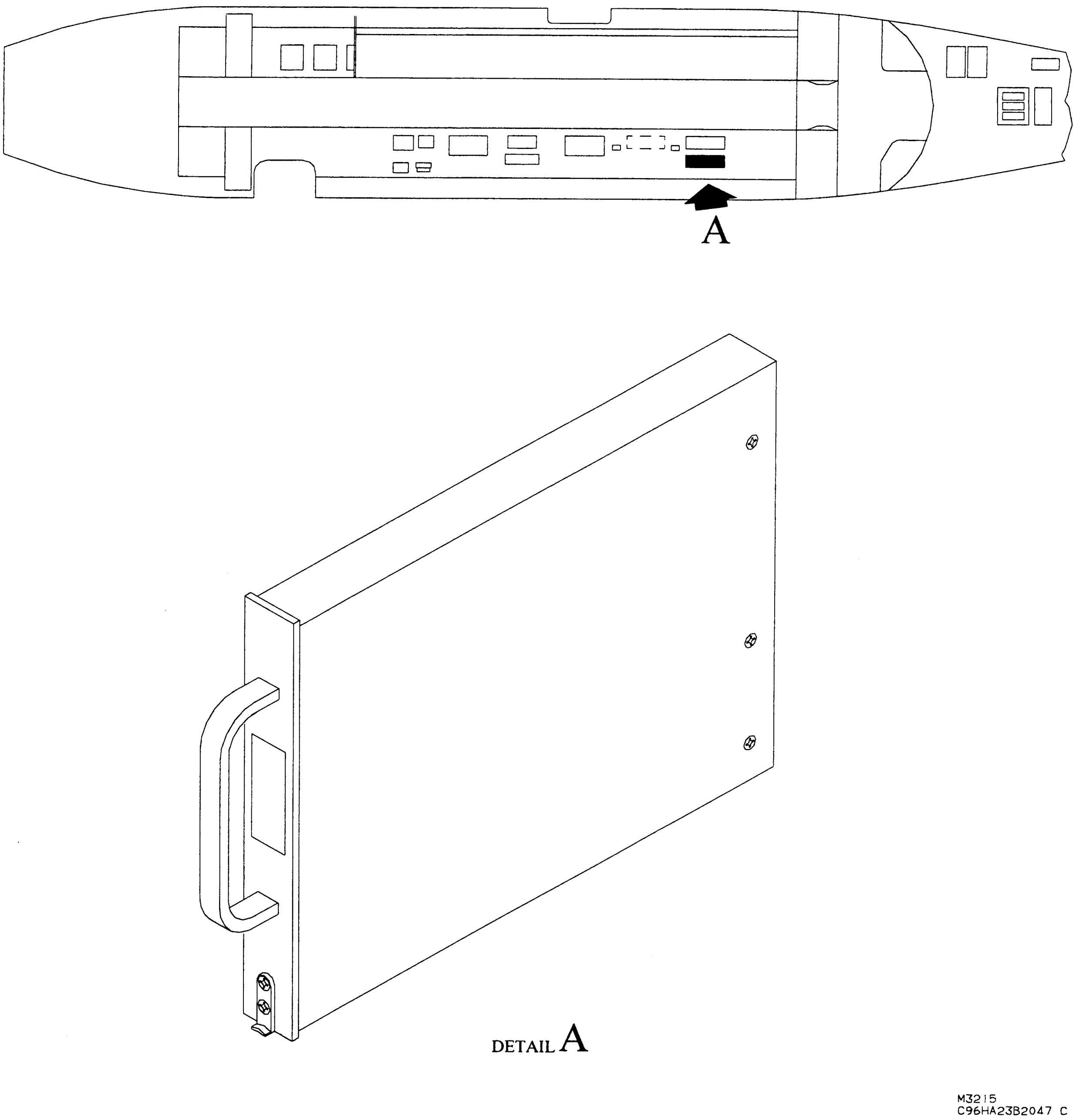
(2) Do a functional check on SELCAL system - MMA, Chapter 23, COLTECH SELCAL DECODER - ADJUSTMENT/TEST.

4. Close Up

A. Final Procedures

(1) Make sure the working area is clean and clear of all tools and miscellaneous equipment.

(2) Install RH aft baggage compartment panels (Chapter 25 - EQUIPMENT/FURNISHINGS, AFT BAGGAGE COMPARTMENT).



SELCAL decoder location - typical
Figure 401

COLTECH SELCAL DECODER - ADJUSTMENT/TEST

1. Adjustment/Test

A. Tools and Equipment

NOTE: When using any test set/equipment, use in accordance with the test set manufacturers instructions.

NOTE: Equivalent substitutes may be used in lieu of the following:

Equipment/Material	Item No/Part No.
Coltech CTS-700 SELCAL/ATSCALL ramp test set.	Operator supplied

B. Functional Test Procedures

ACTION		RESULT
(1) Energize the airplane busbars (AMM Chap.24, GENERAL).	...	-
(2) Apply power to the SELCAL system.	...	-
(3) Push the SELCAL TEST button on the center pedestal.	...	After approximately four seconds an indication of a SELCAL decode should be received on all annunciators and the chime will sound.
(4) Using the ramp test set, select the frequency to test one of the radio receivers. On the test set frequency, transmit a SELCAL encoded signal of the code sequence programmed into the SELCAL unit.	...	Verify the appropriate annunciator lamps come on and the chime is heard.
(5) Do this test for all SELCAL channels and for all radios connected to the SELCAL unit.	...	-

HEADS UP PBS-250 PASSENGER BRIEFING SYSTEM - DESCRIPTION AND OPERATION

1. Description

A. General

The Heads Up passenger briefing system is a remotely controlled system designed specifically for passenger briefing. The system provides instant accessibility to pre-recorded messages.

The system consists of the following components:

- One cabin briefer remote computer unit.
- One control head.

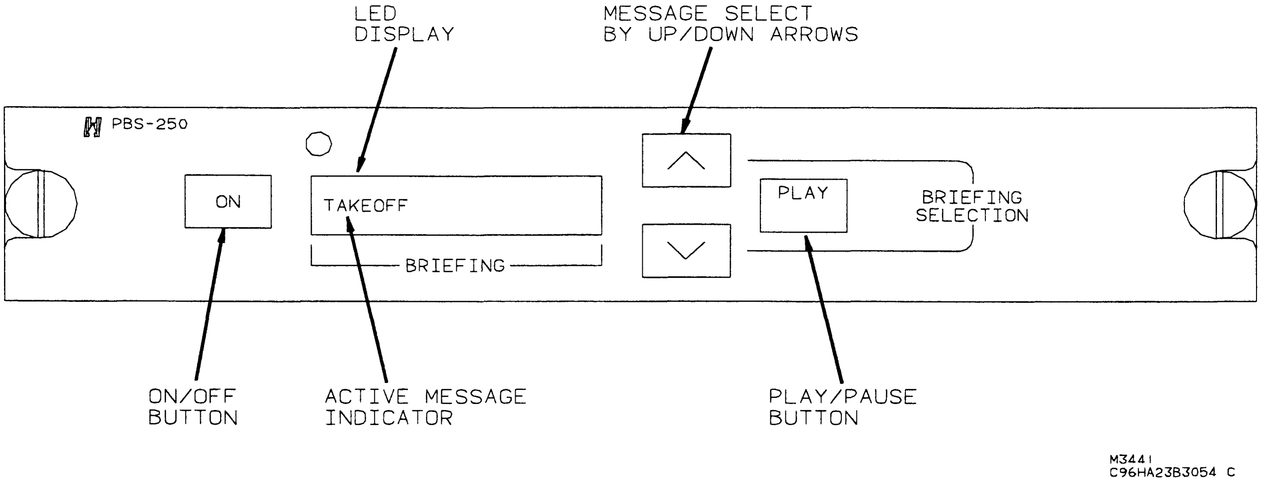
NOTE: The location of equipment may vary on some airplanes. For location of equipment on a particular airplane refer to Chapter 31, INSTRUMENTS GENERAL and Chapter 34, AVIONICS GENERAL in the Maintenance Manual Addenda for the particular airplane.

B. Cabin Briefer Remote Computer Unit

The Heads Up computer is a remote mounted microprocessor based computer system which stores and controls the digital briefing messages.

C. Control Head *(Figure 1)*

The control head has a PLAY button, ON button and UP/DOWN message selection buttons. An LED display indicates the message being played. The control head is located in the cockpit.



Control Head

Figure 1

2. Operation

CAUTION: DURING ENGINE START UP PROCEDURES, LARGE SPIKES, WHICH CAN BE HARMFUL TO SENSITIVE ELECTRONIC EQUIPMENT, ARE GENERATED ON THE POWER BUS. AS A STANDARD PRECAUTION, ALL AVIONICS EQUIPMENT SHOULD BE SWITCHED OFF WHILE ENGINES ARE STARTED.

A. General

(1) Separate message programs can be activated.

(2) All operational activities are done from the control head.

B. Selecting a Briefing Message

The desired briefing is executed by pushing the UP/DOWN arrow buttons to the selected message and pressing the PLAY button. The message will then play over the cabin speakers.

HEADS UP PBS-250 PASSENGER BRIEFING SYSTEM - REMOVAL/INSTALLATION

WARNING: DURING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, WATER, DRAIN, AIR CONDITIONING, AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

NOTE: *Information qouted in paragraph 1. General and paragraph 3. Close Up is applicable to the Removal/Installation of ALL equipment in this system.*

1. General

A. Preliminary Procedures

(1) Open, safety, and tag the following circuit breaker.

Panel	Label
DA-A	PASS BRIEF UNIT

NOTE: *The removal and installation of the Heads Up PBS-250 Passenger Briefer System equipment is considered self evident therefore no instructions are detailed.*

NOTE: *The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 31, INSTRUMENTS GENERAL and Chapter 34, AVIONICS GENERAL in the Maintenance Manual Addenda for the particular airplane.*

NOTE: *When Removing/Installing any Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda procedures.*

2. Removal/Installation

A. Removal

(1) Locate and remove equipment as required.

B. Installation

(1) Install equipment removed at paragraph 2.A.(1).

3. Close Up

A. Final Procedures

(1) Close the PASS BRIEF UNIT circuit breaker on panel DA-A.

(2) Do a functional test of the cabin briefing system (MMA - ADJUSTMENT/TEST).

(3) Make sure the working area is clean and clear of all tools and miscellaneous equipment.

HEADS UP PBS-250 PASSENGER BRIEFING SYSTEM - ADJUSTMENT/TEST

1. Adjustment/Test

A. Functional Test Procedures

NOTE: *When operating any other systems referred to in this procedure, make sure ALL operations are done in accordance with the instructions in the relevant AMM or MMA.*

ACTION		RESULT
(1) Energize the airplane busbars (AMM Chap.24, GENERAL).	...	-
(2) Apply dc power to the Heads Up System and the Cabin Audio System.	...	-
(3) Turn the PBS-250 computer on by pushing the ON button on the control head.	...	The computer will do a self test - a self test message appears on the LED display. A successful self test is indicated when a message title replaces the self test message.
(4) Select any message (except AUTO) using the UP/DOWN arrows then push PLAY.	...	After a two second delay, the message should be audible in the cabin.
(5) Set the Heads Up System and the Cabin Audio System to off.	...	-
(6) De-energize the airplane busbars (AMM Chap.24, GENERAL).	...	-

BAKER CABIN PAGING SYSTEM DESCRIPTION AND OPERATION

1. Description

A. General

(1) The Baker cabin paging system includes:

- M-1050 PA/Chime Amplifier
- M-1285 Chime/Tone Warning System
- M-1052A Interphone Amplifier

B. Operation

(1) PA/Chime Amplifier

The PA/chime amplifier is a remote mounted unit that provides amplification for entertainment audio, paging, electronic chimes and interrupt of entertainment during paging and chimes.

(2) Chime/Tone Warning System

The chime/tone warning system generates separate and distinct tones designed to alert the flight crew and passengers of preselected events.

Refer to the following tables for typical functions of chimes and tones:

Table 1: Pilot Activated Chimes

Function	Input Enable	ON Chime	OFF Chime
Fasten Seat Belt Sign	+28 volt	2-tone	1-tone (high)
No Smoking Sign	+28 volt	2-tone	1-tone (high)
Passenger Address	Ground	2-tone	None
Passenger Briefing	Ground	2-tone	None

Table 2: Crew Alert Chimes

Chime/Tone	Typical Function
1-tone chime (high)	TKS anti-ice warn
2-tone chime (high-low)	Cockpit call
1-tone chime (low)	SELCAL (if installed)
1-tone chime (low)	Cockpit Clocks
Cavalry charge (1-5 seconds)	AP disconnect (normal)
Cavalry charge (indefinite) *NOTE: Indefinite until cancelled by the crew*	AP disconnect (abnormal)
C-Chord	ALT alert/vertical track

(3) Interphone Amplifier

The interphone amplifier is a single station interphone amplifier for the observer's seat where full cockpit audio control is not required. The observer has full interphone capability with the pilot and copilot and is able to monitor the cockpit audio selection of either the pilot or copilot. The amplifier has a volume control.

BAKER CABIN PAGING SYSTEM REMOVAL/INSTALLATION

WARNING: DURING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, AND WATER, DRAIN, AIR CONDITIONING AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

NOTE: Information qouted in paragraph 1. General and paragraph 3. Close Up is applicable to the Removal/Installation of ALL equipment in this system.

1. General

A. Preliminary Procedures

(1) Open, safety, and tag the following circuit breakers.

Panel	Label
DA-A	AUDIO 1
DA-A	AUDIO 2
DA-A	OBSERVERS AUDIO
DA-D	CHIME AMP
DA-D	PAGING AMP

NOTE: The removal and installation of the Cabin Paging Equipment is considered self evident therefore no instructions are detailed.

NOTE: The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 34, AVIONICS GENERAL in the Maintenance Manual Addenda for that particular airplane.

NOTE: When Removing/Installing any Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda procedures.

2. Removal/Installation

A. Removal

(1) Locate and remove equipment as required.

B. Installation

(1) Install equipment removed at paragraph 2.A.(1).

3. Close Up and Test

(1) Remove the safety clip and tag and close the circuit breaker opened in paragraph 1.A.(1).

(2) Do a functional check on the cabin paging system (ADJUSTMENT/TEST).

(3) Make sure the working area is clean and clear of all tools and miscellaneous equipment.

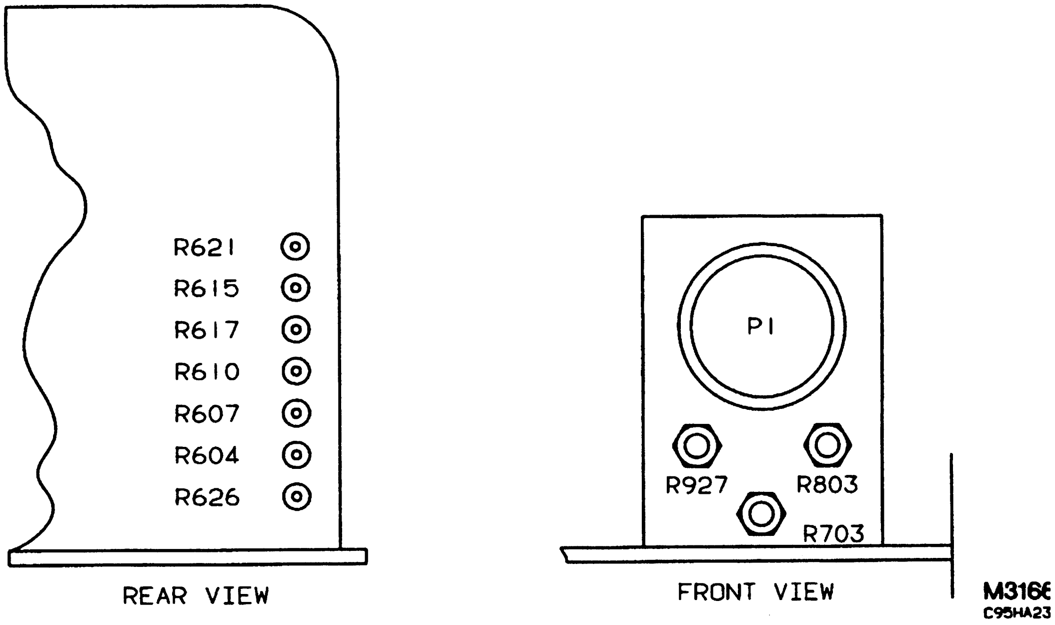
BAKER CABIN PAGING SYSTEM - ADJUSTMENT/TEST

1. Adjustment/Test

NOTE: When operating any other systems referred to in this procedure, make sure ALL operations are done in accordance with the instructions in the relevant AMM or MMA.

A. Chime/Tone Warning System Adjustments *(Figure 501)*

Refer to Aircraft Maintenance Manual, Chapter 23, for chime/tone warning system adjustment functions.



Chime/Tone Warning System Adjustments

Figure 501

B. M-1050 PA/Chime Amplifier Adjustments

The output levels of the PA/chime amplifier are adjustable as follows:

Table 1: M-1050 PA/Chime Amplifier Adjustments

Control	Adjustment
R1	Mic level input from cockpit.
R2	Mic level input from cabin.
R3	Chime level to cabin speakers.
R4	Chime level to cockpit.
R5	Sidetone level to cockpit.
R6	Interphone level to cockpit.
R7	Interphone level to cabin.
R8	Audio input level from M-2000.
R9	Video audio input - unbalanced 2 ohms input.
R10	Video audio input - balanced 600 ohm input.

C. Test Procedures

For the cabin paging system operation and test procedures, refer to AMM, Chapter 23 and Chapter 34.

HONEYWELL AV-850A INTEGRATED AUDIO SYSTEM DESCRIPTION AND OPERATION

1. Description

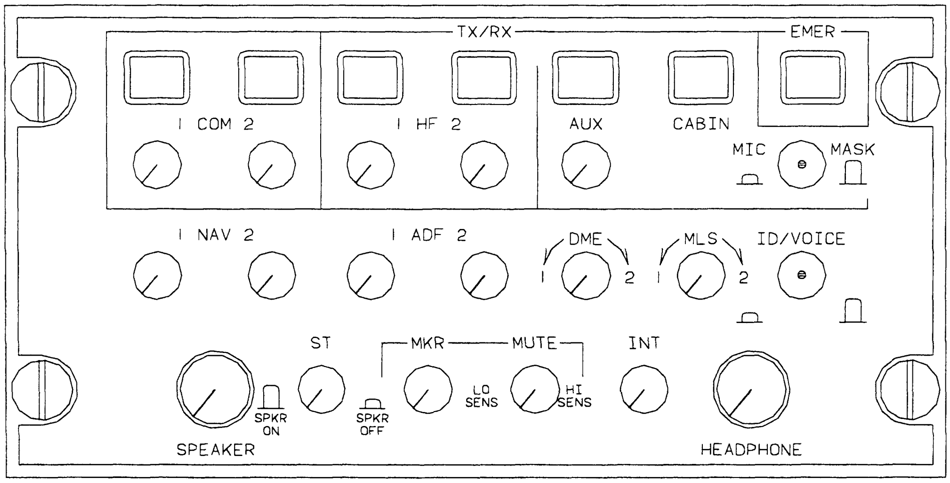
A. General

The AV-850 audio select panel (ASP) provides audio control for the SRZ-850 integrated radio system. One audio select panel is installed on the pilot's vent panel and one on the copilot's vent panel.

B. Audio Select Panel *(Figure 1)*

The audio select panel provides the following:

- Distribution of radio and navigation signals.
- Intercommunication capabilities between the flight crew members.
- Intercommunication capabilities between the flight crew members and the passengers.
- Intercommunication capabilities between the fight crew and ground crew.
- Passenger address capabilities.



M3267
C95HA23C0824 AI

AV-850A Audio Select Panel
Figure 1

2. Operation

All audio from the VHF communications (VHF COM), VHF navigation (VHF NAV), automatic direction finder (ADF), distance measuring equipment (DME) and marker is transmitted from remote units to the audio select panels (ASP) on a dedicated digital audio bus.

The top row of buttons are transmit/receive (TX/RX) select buttons. Push the button to transmit and receive on that radio. Audio associated with that radio is activated at a preset volume regardless of the audio on/off/level controls.

The audio on/off/level controls are located below the TX/RX select buttons and have two latched axial positions.

- Push the button (in) to turn all audio off (in/off).
- Push the button again, and it moves out to the on position (out/on).
- Turn the control to adjust audio level for that radio.

Individual controls are provided for: (VHF) COM 1 and 2, HF 1 and 2, AUX, (VHF) NAV 1 and 2, ADF 1 and 2, DME 1 and 2, MKR and INT (Intercom). A control marked ST (installed as part of the SPKR ON/OFF switch) gives the side tone level adjustment when the loudspeaker is in use. Headphone sidetone level adjustment is automatic. Overall level of received signals is controlled by two rotary controls marked HEADPHONE and SPEAKER.

An additional a non-latching rotary control marked MKR MUTE LO SENS - HI SENS adjusts marker receiver sensitivity to prevent receiver overload when flying over beacons. Push this control to temporarily mute the marker audio. The mute function will time out if the marker audio drops below a set level.

Two push on/off switches are provided.

- ID/VOICE - is used to filter the NAV and ADF signals. In the ID mode (in position), the VOR or ADF audio is filtered to enhance the morse code identification.
- MASK/MIC - is used to select between mask or boom microphones (a hand microphone can be utilized by pushing its PTT switch, regardless of the MASK/MIC switch setting).

Passenger address capability functions by pushing the CABIN button. This isolates the passenger entertainment system switch or volume control settings and enables microphone announcements in the cabin.

Ground crew intercom capabilities are enabled by operation of the INT on/off/level control on the ASP.

In case of power loss or audio system failure, push the EMER button to bypass the ASP and place the emergency COM and NAV audio directly into the headphones. The microphone will automatically be connected to the No. 1 VHF COM.

Under normal conditions, an associated loudspeaker (two are mounted in the flight deck roof), can be activated by pushing the SPKR ON/SPKR OFF switch. The speakers are controlled with the speaker rotary control.

Mounted on each control column handwheel is a three position switch with a center off position. Pulling the switch back against spring pressure (MIC position) keys the selected radio transmitter.

Two additional MIC KEY switches are installed on the glareshield side panels (one on each side of the cockpit). These switches are used to key the selected radio transmitter.

HONEYWELL AV-850A INTEGRATED AUDIO SYSTEM REMOVAL/INSTALLATION

WARNING: DURING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

WARNING: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, AND WATER, DRAIN, AIR CONDITIONING AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

1. General

NOTE: *The location of equipment in this topic shows a typical installation. The location of equipment may vary on some airplanes. For location of equipment on a particular airplane refer to Chapter 31, INSTRUMENTS GENERAL in the Maintenance Manual Addenda for the particular airplane.*

NOTE: *The removal/installation of the Integrated Audio System is considered self evident therefore no instructions are given.*

A. Equipment/Material

Equipment/Material	Part/Item No.
Circuit breaker safety clips	Operator supplied
Circuit breaker tags	Operator supplied

B. Preliminary Procedures

(1) Open, safety, and tag the following circuit breakers.

Panel	Label
DA-A	AUDIO 1
DA-A	AUDIO 2

2. Removal/Installation

A. Removal

(1) Locate and remove equipment as required.

B. Installation

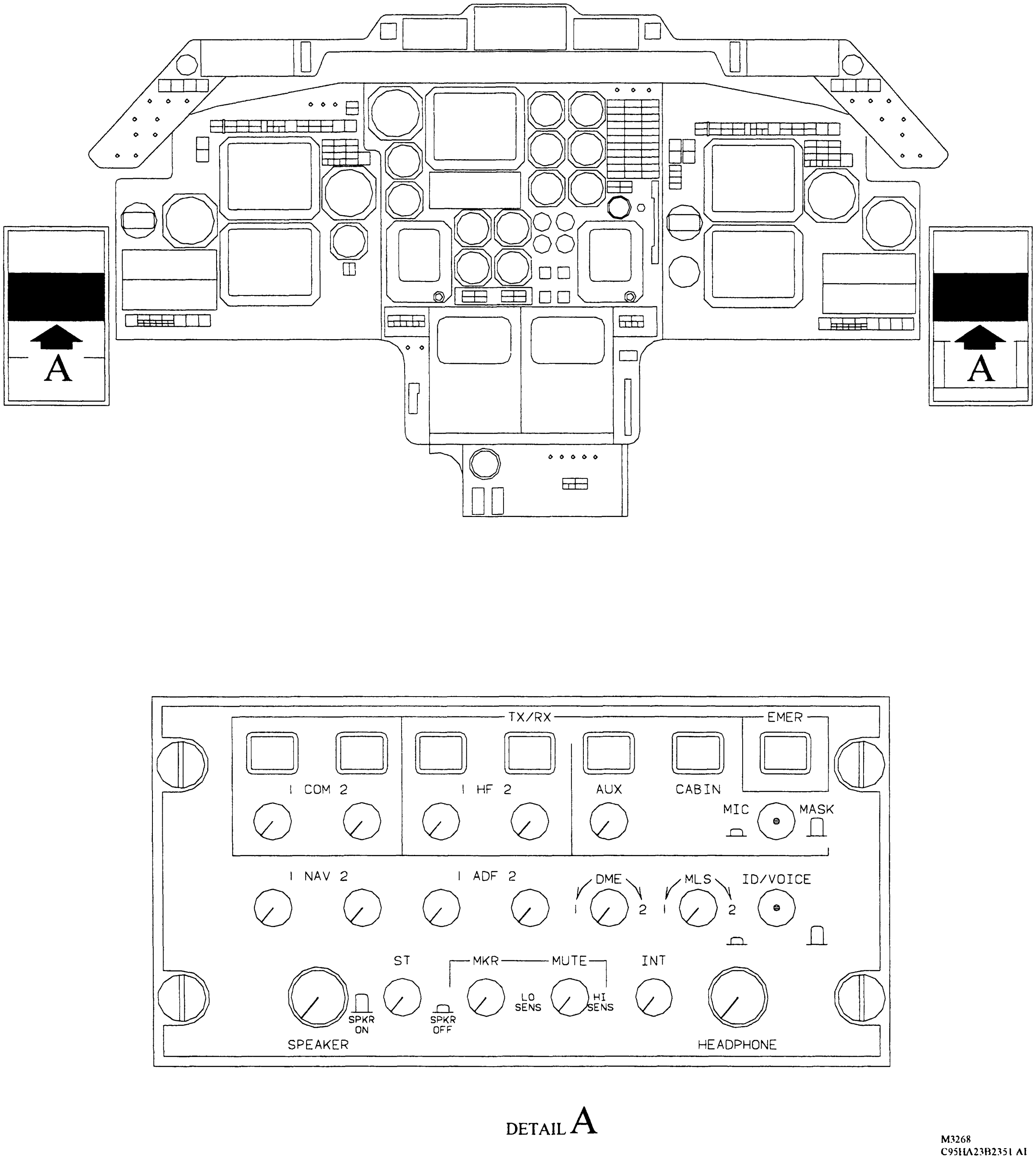
(1) Install equipment removed at paragraph 2.A.(1).

3. Close Up

(1) Close the circuit breakers listed in 1.B.(1).

(2) Do a functional test on the Honeywell AV-850A Integrated Audio System (ADJUSTMENT/ TEST).

(3) Make sure the working area is clean and clear of all tools and miscellaneous equipment.



Audio Select Panel - (typical installation)

Figure 401

HONEYWELL AV-850A INTEGRATED AUDIO SYSTEM ADJUSTMENT/TEST

1. Adjustment/Test

NOTE: *When operating any other systems referred to in this procedure, make sure ALL operations are done in accordance with the instructions in the relevant AMM or MMA.*

NOTE: *When using any test set/equipment, use in accordance with the test set manufacturers instructions.*

A. Equipment/Material

Equipment/Material	Part/Item No.
Two Headsets.	Operator supplied
NAV test set.	Operator supplied

B. Preliminary procedures

ACTION		RESULT
(1) Energize the aircraft busbars (CHAP.24, GENERAL)	...	-
(2) On the pedestal, set the RADIO 1 and RADIO 2 switches to ON.	...	The OFF legends go off. The ON legends come on.
(3) On the overhead panel, push the LTS MASTER switch.	...	The ON legend comes on.
(4) On center instrument panel, turn the dimmer control clockwise and counterclockwise.	...	The audio controllers integral lighting varies in sympathy with control movement.
(5) Adjust the dimmer control to set the audio controllers lighting to suit the ambient conditions.	...	-

NOTE: *To select a radio push the TX/RX button above the appropriate radio (out/on). A green light will come on in the button. Previously selected switches will deselect and their green lights will go off. To deselect the current radio push any other TX/RX button enough to cause the selected radio button to pop out, but do not push hard enough to select that radio.*

C. Functional Test Procedure

ACTION	RESULT
VHF COMM	
(1) Switch on the VHF COMM and do the power on self test.	-
(2) Connect a headset to the pilot's HEADSET socket.	-
NOTE: Most actions are done on the pilot's audio controller. If this is not the case, the unit will be identified.	
(3) On the ASP, set the COM 1 microphone switch.	The switch latches in and its green light comes on.
(4) On the ASP, push (out) the COM 1 and ST volume controls and set them to their mid position.	-
(5) On the ASP, set the SPEAKER and HEADPHONE volume controls to their mid position.	-
(6) On the left RMU, push the LSK adjacent to the COM 1 window.	The cursor box is in the COM 1 window.
(7) On the left RMU, use the tuning knobs to set a VHF frequency.	The selected frequency shows in the cursor box.
(8) On the left RMU push the transfer key (left side).	The present frequency, in the cursor box, changes places with the active frequency.
(9) On the left RMU, push the SQ key.	a) The SQ annunciator displays in the COM 1 window. b) Noise is heard in the pilot's headset and speaker.
(10) On the ASP, turn the COM 1 volume control clockwise and counterclockwise.	The noise in the pilot's headset varies in sympathy with the control movement.
(11) On the ASP, turn the HEADPHONE control clockwise and counterclockwise.	The noise in the pilot's speaker varies in sympathy with the control movement.
(12) On the ASP, turn the SPEAKER control clockwise and counter clockwise.	The noise in the pilot's speaker varies in sympathy with the control movement.
(13) On the ASP, push (in) the ST control.	The noise in the pilot's speaker stops.

ACTION	RESULT
(14) Push (out) the ST control.	The noise in the pilot's speaker returns.
(15) On the left RMU push the SQ key again.	a) The SQ annunciator goes out of view. b) The noise in the pilot's headset and speaker ceases.
(16) Set the frequency of a local test channel and make a test transmission using the pilot's hand microphone.	Sidetone and audio is heard in the pilot's speaker.
(17) On the ASP, turn the ST control clockwise and counterclockwise.	The volume of the sidetone varies in sympathy with control movement.
(18) On the ASP, set the EMER microphone switch.	a) The switch latches in and its amber/white light comes on. b) The COM 1 switch latches out and its green light goes off.
(19) Set the frequency of a local test channel and make a test transmission using the pilot's INTER/MIC switch.	Received audio and sidetone is only heard in the pilot's headset.
(20) On the ASP, set the COM 1 microphone switch.	a) The switch latches in and its green light comes on. b) The EMER switch latches out and its amber/white light goes off.
(21) Push the MASK switch.	-
(22) Repeat action 24 talking into the pilot's oxygen mask.	Sidetone is heard in the pilot's speaker at a fixed minimum volume.
(23) On the ASP, turn the ST volume control clockwise.	The side tone volume increases.
(24) On the ASP, turn the speaker volume control clockwise and counterclockwise.	This has no effect on the side tone volume.
(25) Deselect the MASK switch.	-
(26) On the ASP, set the COM 2 microphone switch.	a) The switch latches in and its green light comes on. b) The COM 1 switch latches out and its green light goes off.
(27) Push out the COM 2 volume control.	-
(28) On right RMU push the LSK adjacent to the COM 2 window.	The cursor is in the COM 2 window.

ACTION	RESULT
(29) On right RMU, use the tuning knobs to set a VHF frequency.	The selected frequency displays in the cursor box.
(30) On the right RMU, push the transfer key (left side).	The present frequency in the cursor box changes places with the active frequency.
(31) On right RMU, push the SQ key.	a) The SQ annunciator displays in the COM 2 window. b) Noise is heard in the pilot's headset and speaker.
(32) On the ASP, turn the COM 2 volume control clockwise and counterclockwise.	The noise in the pilot's headset varies in sympathy with the control movement.
(33) On the ASP, push (in) the COM 2 volume control.	-
HF COMM	
(34) On the ASP, set the HF 1 microphone switch.	a) The switch latches in and its green light comes on. b) The COM 2 switch latches out and its green light goes off.
(35) On the ASP, push (out) the HF 1 volume control.	-
(36) On HF 1, make a test call to a local ground station.	-
(37) During the reply from the ground station, turn the HF 1 volume control clockwise and counterclockwise.	The level of received signals varies in sympathy with the control movement.
(38) On the ASP, push (in) the HF 1 volume control.	-
Nav and MKR	
(39) Connect and switch on a NAV test set (VOL/ILS/MKR).	-
(40) On the ASP, push (out) the NAV 1 and 2, and MKR volume controls and set to their mid position.	-
(41) On the left RMU, push the LSK adjacent to the NAV 1 field.	-

	ACTION	RESULT
(42)	On the ASP, push and hold the TST key on the left side RMU.	The inner, middle and outer marker tones are heard in the pilot's headset.
(43)	On the ASP, turn the NAV 1 volume control clockwise and counterclockwise.	The marker tones vary in sympathy with the control movement.
(44)	On the ASP, turn the MKR volume control clockwise and counterclockwise.	The marker tones vary in sympathy with the control movement.
(45)	On the ASP, release the TST key on the left side RMU.	-
(46)	On right RMU, push the LSK adjacent to the NAV 2 field.	The cursor box moves to the NAV 2 field.
(47)	On the ASP, push and hold the TST key on the right RMU.	The inner, middle and outer marker tones are heard in the pilot's headset.
(48)	On the ASP, turn the NAV 2 volume control clockwise and counterclockwise.	The marker tones vary in sympathy with the control movement.
(49)	On the ASP, set the MUTE control to HI SENS.	-
(50)	Set the test set to the marker mode and set INNER MARKER.	A 3000 Hz tone is heard in the pilot's headset.
(51)	On the ASP, push the MUTE control.	The tone in the pilot's headset is muted.
(52)	On the ASP, attenuate the marker signal for five to ten seconds and then restore it.	The 3000 Hz tone is again heard in the pilot's headset.
(53)	On the test set, set MIDDLE MARKER.	A 1300 Hz tone is heard in the pilot's headset.
(54)	On the ASP, set the MUTE control to LO SENS.	-
	NOTE: This action may remove marker audio and indications. If this happens, omit action 60.	
(55)	On the test set, slowly increase the RF attenuation until the audio ceases.	-
(56)	On the ASP, set the MUTE control to HI SENS.	The 1300 Hz tone is again heard in the pilot's headset.

ACTION	RESULT
(57) On the ASP, push (in) the NAV 1 and 2, and MKR volume controls.	-
ADF	
(58) On the ASP, push (out) the ADF 1 and 2 volume controls and set to their mid positions.	-
(59) Push (in) the ID/VOICE control.	-
(60) On the left RMU, push the LSK adjacent to the ADF window.	The cursor box moves to the ADF window.
(61) On the left RMU, push and hold the TST key.	ADF 1 audio tone is heard in pilot's headset.
(62) On the ASP, release the TST key.	-
(63) On the ASP, turn the ADF 1 control clockwise and counterclockwise.	The ADF 1 tone varies in sympathy with the control movement.
(64) Repeat actions 60 and 61 on the right RMU.	ADF 2 audio tone is heard in the pilot's headset.
(65) On the ASP, turn the ADF 2 control clockwise and counterclockwise.	The ADF 2 tone varies in sympathy with the control movement.
(66) On the ASP, release the TST key.	-
(67) On left RMU, push the LSK adjacent to the ADF window.	The cursor box moves to the ADF frequency field.
(68) Tune the ADF to a strong local broadcasting station.	Audio is heard in the pilot's headset, but the quality is poor.
(69) Push the LSK adjacent to the ADF mode field and set the BFO mode.	A beat frequency is added to the audio.
(70) Push the LSK adjacent to the ADF mode field and set the VOICE mode.	The beat frequency ceases and the quality of the audio improves.
(71) On the ASP, push (out) the ID/VOICE control.	The quality of the audio further improves.
(72) On the ASP, push (in) the ADF 1 and 2 volume controls.	-

ACTION		RESULT
(73) On the ASP, push (in) the ID/VOICE control.	...	-
DME		
(74) On the ASP, push (out) the DME volume control and set to 1.	...	-
(75) Produce a DME 1 ident signal from the test set.	...	Ident signal is heard in the pilot's headset.
(76) On the ASP, turn the DME control to its mid position.	...	Ident signal volume decreases until it stops.
(77) On the ASP, turn the DME control 2.	...	-
(78) Produce a DME ident signal from the test set.	...	Ident signal is heard in the pilot's headset.
(79) On the ASP, Turn the DME control to its mid position.	...	Ident signal volume decreases until it stops.
(80) On the ASP, push (in) the DME volume control.	...	-
Passenger Address		
(81) On the ASP, set the CABIN microphone switch.	..	a) The switch latches in and its green light comes on. b) The HF 1 switch latches out and its green light goes off.
(82) Use the pilot's hand microphone to make a test announcement.	...	Audio is heard in the cabin speakers.
(83) On the ASP, deselect the CABIN microphone switch.	...	The switch latches out and its green light goes off.
Intercom		
(84) Connect headsets to the ground crew jack boxes.	...	-
(85) On the ASP, push (out) the INT control and set to its mid-position.	...	-
(86) Do a two way communication between the pilot's headset and each jack box in turn.	...	Audio is heard in the pilot's headset and the jack box headset.

ACTION	RESULT
(87) On the ASP, turn the INT control clockwise and counterclockwise.	The audio varies in sympathy with the control movement.
(88) On the pilot's audio controller:	
(a) Deselect all the microphone switches.	
(b) Push (in) all the volume controls.	
(c) Turn all the volume controls fully counterclockwise.	-
Copilot's audio controller	
(89) Repeat steps 6 through 88 for the copilot's audio controller.	Same results as 6 through 88.

D. Close Up

ACTION	RESULT
(1) Disconnect and remove the NAV test set.	-
(2) On the overhead panel, push the LTS MASTER switch	The ON legend goes off.
(3) Set the RADIO 1 and Radio 2 switches to OFF	The OFF legends come on.
(4) Disconnect the headsets and remove from the aircraft.	-
(5) De-energize the aircraft busbars (CHAP.24, GENERAL).	-
(6) Make sure the working area is clean and clear of all tools and miscellaneous equipment.	-

UNIVERSAL NAVIGATION CVR-30A COCKPIT VOICE RECORDER - DESCRIPTION AND OPERATION

1. Description

A. System

The Universal Navigation CVR-30A cockpit voice recorder (CVR) is a solid state flash memory recording device that records all voice signals transmitted or received by the pilot and copilot, as well as cabin page announcements. The cockpit area microphones are installed to pick up and record cockpit conversations. Recording is continuous up to 30 minutes; beyond 30 minutes the recordings are automatically erased as new recordings are made.

The CVR system includes the following:

- Control unit
- Solid state recorder
- Two area microphones
- Underwater locator beacon (ULB).

The CVR simultaneously accepts four audio inputs. These inputs may be either transmitted or received signals from the following stations:

- Observer's audio (Channel 1) (not used)
- Copilot's audio select panel (Channel 2)
- Pilot's audio select panel (Channel 3)
- Cockpit area microphones (Channel 4).

The inputs are converted to a digital format and stored in a solid state memory array. The memory array consists of devices known as flash memory, which are electrically erasable and programmable.

B. Control Unit

The control unit is panel mounted and provides remote control for the CVR. The front panel of the unit has the following items:

- Headphone jack
- Bulk erase switch
- Test switch
- Signal level meter
- PASS and FAIL lights.

The control unit also contains an amplifier for the area microphones.

C. Cockpit Voice Recorder

The CVR is housed in a 1⁄2 ATR short rack.The recorder unit contains the recorder assembly and associated electronics. The unit is painted international orange.

Signals from the audio channels are fed to a monitor before entering the CVR input circuits. The monitor feeds the audio signals to the HEADPHONE jack socket and the SIGNAL LEVEL indicator on the control unit.

A test circuit in the CVR generates a test signal to check the operation of all four audio channels. Each channel can be tested in sequence automatically by pushing the TEST push switch on the control unit.

A bulk erase circuit in the CVR is used to erase the entire recording. This is usually done at the end of a routine flight. The bulk erase sequence is done with the ERASE switch on the control unit (only operational when the aircraft is on the ground). To prevent accidental erasure, the switch must be pushed for at least five seconds.

D. Area Microphone

The CVR-30A uses two minature, electret type, omnidirectional pattern, remotely mounted area microphones.

E. Underwater Locator Beacon

The DK100 Underwater Locator Beacon (ULB) is a battery operated underwater acoustic pulse generator that is activated when the water switch end is immersed in water. It consists of a self-contained battery, electronic module and a transducer. It is housed in a cylindrical watertight aluminium case capable of withstanding high-G impact shocks and deep water immersion. The ULB is mounted on the CVR front panel for easy removal and for easy viewing of the battery expiration date. The ULB will transmit for 30 days (minimum). The battery in the DK100 has a life of six years and must be replaced by the manufacturer (Dukane).

2. Operation

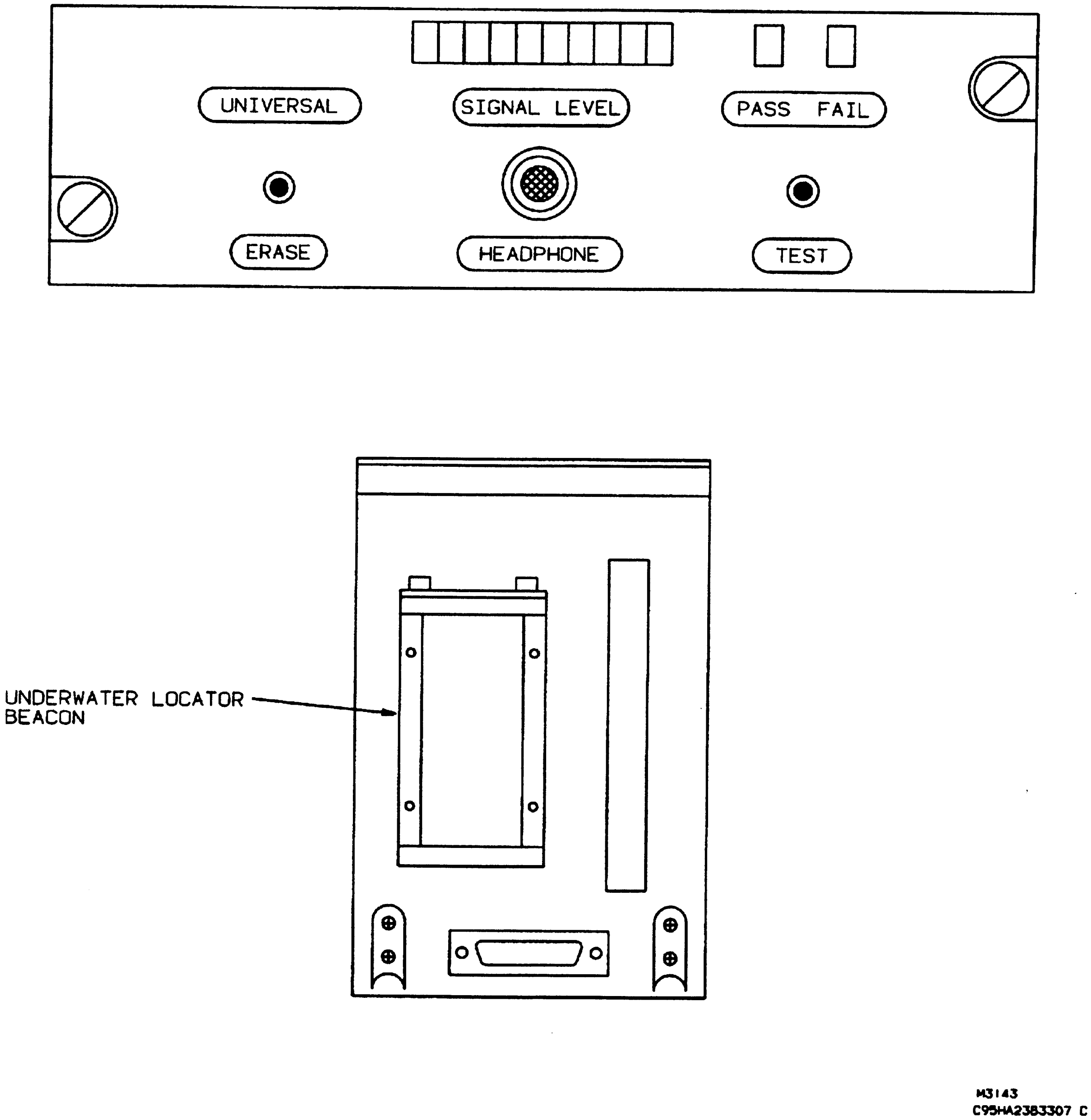
With the aircraft busbars energized, aircraft 28v dc passes through the closed contact of the relay and the inertia switch on the CVR. The power goes to a converter which changes it to 115v ac 400 Hz. This voltage then goes to the power supply pin on the CVR, regulated for use in the pre-amplifier of the control unit, and +30v dc unregulated for use in the CVR.

The operation of the CVR is controlled by a microprocessor which operates at 12 MHz. The microprocessor is closely coupled to an 18 M-byte flash memory array and does the flash memory programming functions. When the CVR is in the record mode the compressed Adaptive Differential Pulse Code Modulation (ADPCM) data is read from a hardware interface and stored in the flash memory array using special programming algorithms. This process is reversed for the play mode. All other control functions such as self test and bulk erase are done by the microprocessor.

Bulk erasure of the flash memory can only be done on the ground. The weight on wheels switches must be made for erasure to be done. The CVR sends an erase signal to initiate its own erase circuits. To erase all the flash memory with only aircraft power available, the control unit ERASE switch must be pushed for at least five seconds. This enables the erase program in the microprocessor to erase the flash memory array. Erasure takes approximately fifteen seconds to complete. During the erasure process the PASS and FAIL lights on the control unit will flash simultaneously and the SIGNAL LEVEL indicator will modulate with cockpit audio.

If power supplies to the CVR are cut off due to a severe aircraft accident, or if they are switched off for any reason, the recorder stops recording with the last 30 minutes of recorded information held in the flash memory. In a ditching situation, the ULB on the CVR front panel is activated by its water sensitive switch and radiates a pulsed acoustic signal into the surrounding water to assist in locating the CVR.

When the TEST switch on the control unit is pushed, the test circuit inserts a 600 Hz signal, at a predetermined level, into each of the four record amplifiers alternately. The signal is inserted in sequence for a period of approximately 0.8 seconds per channel. This recording is played back through the monitor amplifier and can be monitored at the headset jack socket. The monitor amplifier also feeds test signals to the test meter.



Cockpit Voice Recorder and Controller

Figure 1

UNIVERSAL NAVIGATION CVR-30A COCKPIT VOICE RECORDER - REMOVAL/INSTALLATION

WARNING: DO NOT REMOVE THE UNDERWATER LOCATOR BEACON BATTERY. HAZARDOUS CHEMICALS MAY BE RELEASED AND THE MANUFACTURERS WARRANTY WILL BECOME VOID.

WARNING: WHEN DOING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, WATER, DRAIN, AIR CONDITIONING AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

NOTE: Information qouted in paragraph 1, General and paragraph 3. Close Up is applicable to the Removal/Installation of ALL equipment in this system.

1. General

A. Preliminary Procedures

(1) Open, safety and tag the following circuit breaker:

Panel	Label
DA-A	CVR

NOTE: The removal and installation of the Cockpit Voice Recorder and Controller is considered self evident therefore no instructions are detailed.

NOTE: The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 31, INSTRUMENTS GENERAL and Chapter 34, AVIONICS GENERAL in the Maintenance Manual Addenda for the particular airplanes.

NOTE: When Removing/Installing any Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda procedures.

2. Underwater Locator Beacon

A. Removal

(1) Remove the cockpit voice recorder from its tray.

(2) Remove the nuts from the securing plate on the top of the mounting cradle.

(3) Remove the securing plate.

(4) Remove the beacon from the mounting cradle.

B. Installation

(1) Install the beacon in the mounting cradle.

(2) Make sure that the water switch is facing down. This is to prevent accumulation of dirt, grease and water.

(3) Install the securing plate.

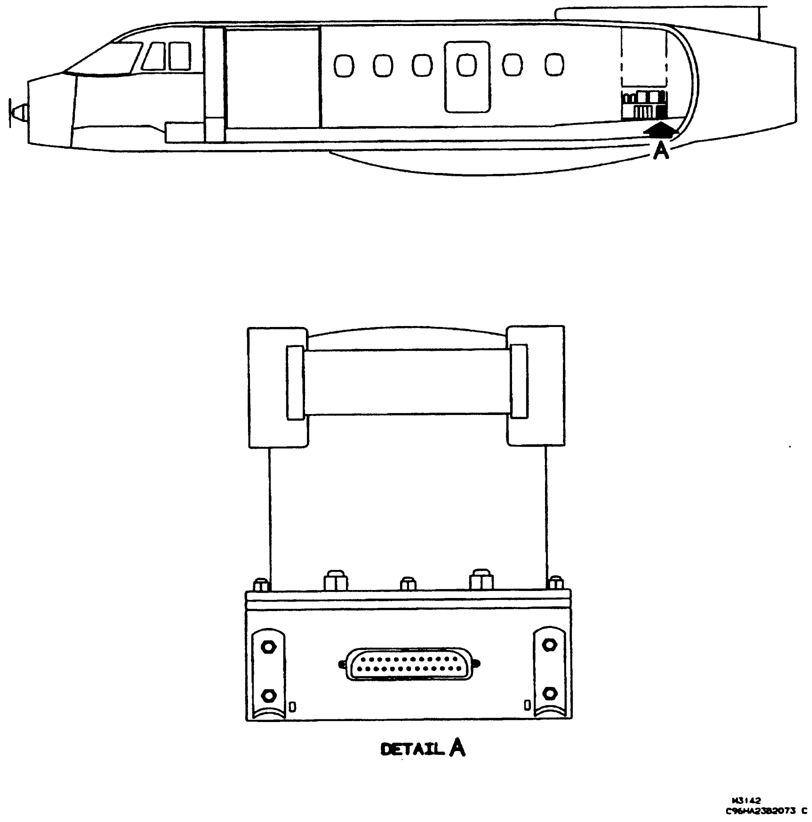
(4) Install the securing nuts.

3. Close Up

(1) Remove the safety clip and tag and close the circuit breaker opened in paragraph 1.A.(1).

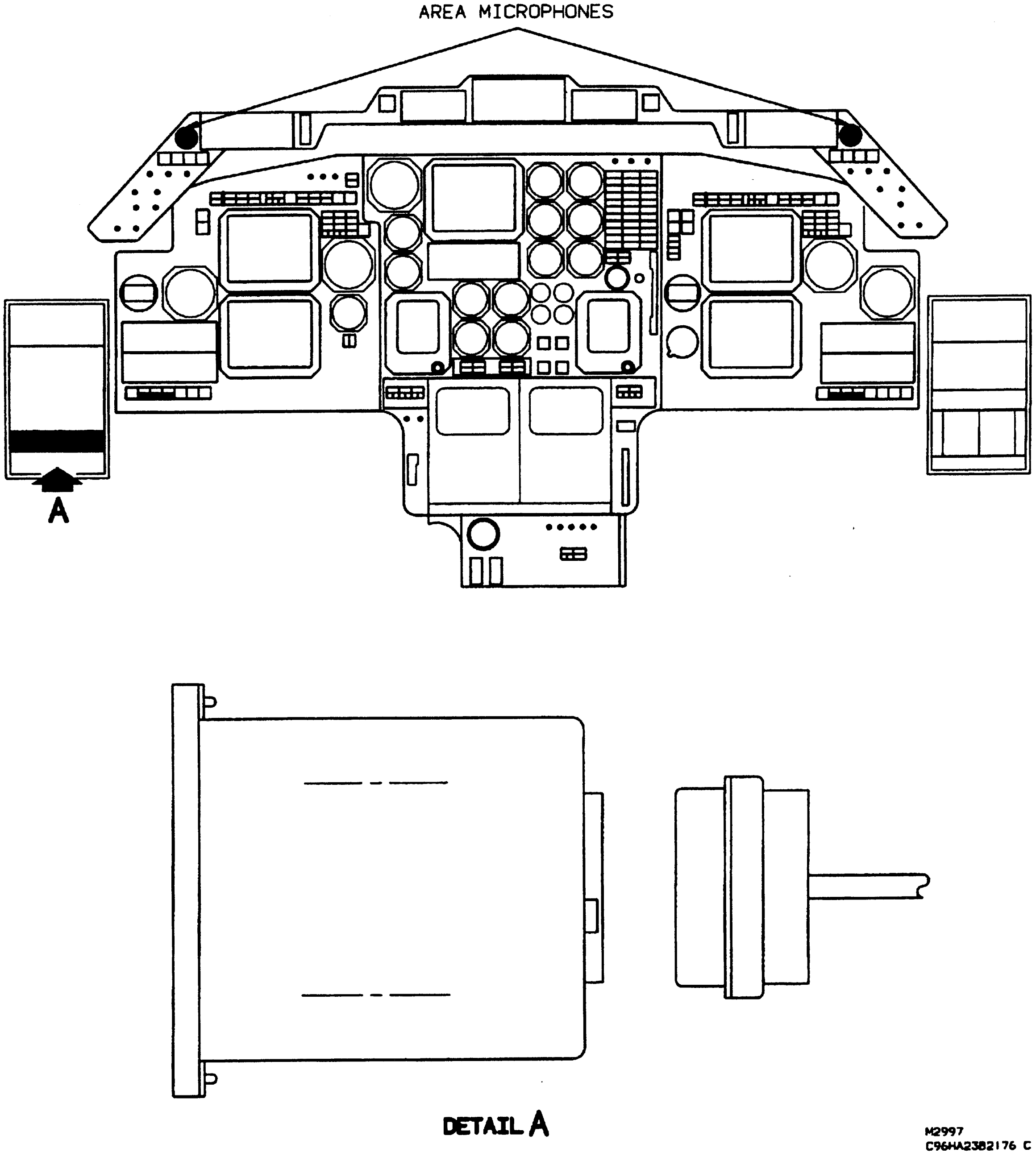
(2) Do the Operational Test and Function Test (ADJUSTMENT/TEST).

(3) Make sure the working area is clean and clear of all tools and miscellaneous equipment.



Cockpit Voice Recorder Location - typical

Figure 401



Cockpit Voice Recorder Controller - typical

Figure 402

UNIVERSAL NAVIGATION CVR-30A COCKPIT VOICE RECORDER

ADJUSTMENT/TEST

1. General

NOTE: *When using any test set/equipment, use in accordance with the test set/equipment manufacturers instructions.*

NOTE: *When operating any other systems referred to in this procedure, make sure ALL operations are done in accordance with the instructions in the relevant AMM or MMA.*

A. Preliminary Procedures

Action		Result
(1) Energize the aircraft busbars (AMM, Chapter 24).	...	-
(2) Set RADIO 1 and RADIO 2 switches to on.	...	Make sure the OFF legends go off and the ON legends come on.
(3) Make sure the audio integrating system is serviceable.	...	-

2. Test Procedures

A. Equipment/Materials

Equipment/Materials	Part No./Item No.
Headset, one.	Operator supplied
PL-1 Pinglite test set ULB.	Operator supplied

B. Operational Test Procedure

Action		Result
(1) Put the headset on and plug into the control unit headphone jack.	...	-
(2) Push the TEST button on the control unit. Hold for one second and release.	...	Initiates the cockpit voice recorder self test. During self test the PASS and FAIL lights will come on alternately indicating that the self test is in progress.

Action	Result
NOTE: The self test will not initiate if the erase feature is in progress. Similarly, if the self test is in progress and erase is activated, self test will abort.	
(3) Talk into the head set. ...	Cockpit conversation will be heard through the headset and visible on the SIGNAL LEVEL indicator. Only active audio will be heard through the headset. The test tone and playback audio will not be heard. No audio is recorded during the self test, which takes approximately 40 seconds to do. On completion of a successful self test the FAIL light will go out and the PASS light will come on for approximately ten seconds. A failed self test is indicated by the FAIL light coming on for approximately 15 seconds (usually flashing). The FAIL light flashes a number of times (see Failure Condition table), pauses and then repeats the same number of flashes.
(4) Open the L/H squat switch. ...	-
(5) Push the ERASE button for five seconds and release. ...	The erase function does not occur.
(6) Close the L/H squat switch. ...	-
(7) Push the ERASE button for five seconds and release. ...	The erase function initiates. The PASS and FAIL lights flash simultaneously. The SIGNAL LEVEL indicator modulates with cockpit audio.

C. Failure Conditions

Number of FAIL flashes	CVR conditions	FAIL light	PASS light
None	Pass	Off	On
1	Channel 1 fail	On	On
2	Channel 2 fail	On	On
3	Channel 3 fail	On	On
4	Channel 4 fail	On	On
5	Partial memory fail	On	On
Steady	Multi channel fail	On	Off

D. Functional Test - ULB

NOTE: The DK100 beacon requires no battery maintenance. Do not remove the battery at any time. The beacon must be removed from service according to the expiration date printed on the beacon case and returned to the manufacturers for servicing.

NOTE: Before doing steps (5) and (6) make sure that the beacon case and water switch are clean and dry. If necessary, or if there is any doubt, wipe the case and switch using a mild detergent and a soft cloth.

NOTE: Before doing step (6), check the battery code on the label on the beacon.

Action		Result
(1) Make sure the REPLACE BATTERY BY date on the ULB is current.	...	-
(2) Short the water switch on the beacon between the center pin and the casing, using the shorting tab assembly from the PL-1 test set.	...	-
(3) Place the PL-1 on the beacon body approximately one inch from the water switch end.	...	-
(4) Push and hold the operation button on the PL-1.	...	The light on the PL-1 flashes with each output pulse of the beacon.
(5) Place the negative lead of a high impedance voltmeter (input impedance of 10 Mohms) on the water switch pin and the positive lead of the meter on the beacon case or mounting kit.	...	-

Action	Result
(6) Measure the battery voltage. ...	Minimum Acceptable Voltage (MAC) for "code A" batteries is 3.55 volts. The MAC for "no code" batteries is 7.10 volts. Return the beacon to the manufacturers if the voltage is below these figures.

NOTE: *The ground test of the CVR-30A is done using the Universal Navigation Corporation test set and harness, a personal computer and an RS232C ANSI compatible terminal or software capable of emulating a VT100/VT102 type terminal.*

E. Close Up

Action	Result
(1) Remove the test set. ...	-
(2) Set the RADIO 1 and RADIO 2 switches to off. ...	Make sure the ON legends go off and the OFF legends come on.
(3) De-energize the aircraft busbars (AMM, Chapter 24). ...	-
(4) Remove the headset from the aircraft. ...	-
(5) Make sure the working area is clean and clear of all tools and miscellaneous equipment ...	-

UNIVERSAL NAVIGATION CVR-30A COCKPIT VOICE RECORDER - INSPECTION/CHECK

1. Inspection

Periodic inspection of the CVR-30A consists of the pre-flight self test. Only if the self test fails is maintenance required on the Cockpit Voice Recorder.

The switch end of the Underwater Locator Beacon (ULB) must be cleaned periodically to prevent leakage currents from occuring. A dirty switch will decrease the battery life. Any time contamination of the water activation switch is seen then the switch must be cleaned. The ULB functional test must be done every 24 months.

UNIVERSAL NAVIGATION CVR-30B COCKPIT VOICE RECORDER - DESCRIPTION AND OPERATION

1. Description

A. System

The Universal Navigation CVR-30B cockpit voice recorder (CVR) is a solid state flash memory recording device that records all voice signals transmitted or received by the pilot and copilot, as well as cabin page announcements. The cockpit area microphones are installed to pick up and record cockpit conversations. Recording is continuous up to 30 minutes; beyond 30 minutes the recordings are automatically erased as new recordings are made. The CVR is also capable of storing other data such as; Greenwich Mean Time (GMT) and CVR internal Built In Test Equipment (BITE) status.

The CVR system includes the following:

- Control unit
- Solid state recorder
- Two area microphones
- Underwater locator beacon (ULB).

The CVR simultaneously accepts four audio inputs. These inputs may be either transmitted or received signals from the following stations:

- Observer's audio (Channel 1) (not used)
- Copilot's audio select panel (Channel 2)
- Pilot's audio select panel (Channel 3)
- Cockpit area microphones (Channel 4).

The inputs are converted to a digital format and stored in a solid state memory array. The memory array consists of devices known as flash memory, which are electrically erasable and programmable.

B. Control Unit

The control unit is panel mounted and provides remote control for the CVR. The front panel of the unit has the following items:

- Headphone jack
- Bulk erase switch
- Test switch
- Signal level indicator
- PASS and FAIL indicators

The control unit also contains an amplifier for the area microphones.

C. Cockpit Voice Recorder

The CVR is housed in a 1⁄2 ATR short rack. The recorder unit contains the recorder assembly and associated electronics. The unit is painted international orange.

Signals from the audio channels are fed to a monitor before entering the CVR input circuits. The monitor feeds the audio signals to the HEADPHONE jack socket and the SIGNAL LEVEL indicator on the control unit.

A test circuit in the CVR generates a test signal to check operation of all four audio channels. Each channel can be tested in sequence automatically by pushing the TEST switch on the control unit.

A bulk erase circuit in the CVR is used to erase the entire recording. This is usually done at the end of a routine flight. The bulk erase sequence is done with the ERASE switch on the control unit (only operational when the aircraft is on the ground). To prevent accidental erasure, the switch must be pushed for at least five seconds.

D. Area Microphone

The CVR-30B uses two miniature, cardioid type, directional microphones. The microphones are mounted in the glareshield.

E. Underwater Locator Beacon

The DK120 Underwater Locator Beacon (ULB) is a battery operated underwater acoustic pulse generator that is activated when the water switch end is immersed in water. It consists of a self-contained battery, electronic module and a transducer. It is housed in a cylindrical watertight aluminium case capable of withstanding high-G impact shocks and deep water immersion.The ULB is mounted on the CVR front panel for easy removal and for easy viewing of the battery expiration date. The ULB will transmit for 30 days (minimum). The battery in the DK120 has a life of six years and must be replaced by the manufacturer (Dukane).

2. Operation

With the aircraft busbars energized, aircraft 28v dc passes through the closed contact of the relay and the inertia switch on the CVR. The power goes to a converter which changes it to 115v ac 400 Hz. This voltage then goes to the power supply pin on the CVR, regulated for use in the preamplifier of the control unit, and +30v dc unregulated for use in the CVR.

The operation of the CVR is controlled by a microprocessor which operates at 12 MHz. The microprocessor is closely coupled to an 18 M-byte flash memory array and does the flash memory programming functions. When the CVR is in the record mode the compressed Adaptive Differential Pulse Code Modulation (ADPCM) data is read from a hardware interface and stored in the flash memory array using special programming algorithms. This process is reversed for the play mode. All other control functions such as self test and bulk erase are done by the microprocessor.

Bulk erasure of the flash memory can only be done on the ground with the weight on wheels relay made. The CVR sends an erase signal to initiate its own erase circuits. To erase all the flash memory with only aircraft power available, the control unit ERASE switch must be pushed for at least five seconds. This enables the erase program in the microprocessor to erase the flah memory array. Erasure takes approximately ten seconds to complete. During the erasure process the PASS and FAIL lights on the control unit will flash simultaneously and the SIGNAL LEVEL indicator will modulate with cockpit audio.

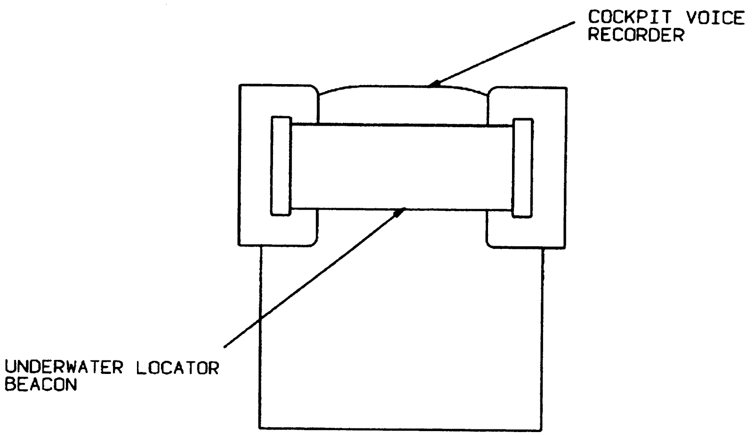
If power supplies to the CVR are cut off due to a severe aircraft accident, or if they are switched off for any reason, the recorder stops recording with the last thirty minutes of recorded information held in the flash memory. In a ditching situation, the ULB on the CVR front panel is activated by its water sensitive switch and radiates a pulsed acoustic signal into the surrounding water to assist in locating the CVR.

When the TEST button on the control unit is pushed, the test circuit injects a signal, at a predetermined level, into each of the four record amplifiers alternately. This recording is played back through the monitor amplifier and can be monitored at the headset jack socket.

CVR errors are detected at three possible times; during power up, during self test and during normal operation. Detected errors are reported by way of the CVR control unit FAIL light. Errors are classified as either non-significant (some audio is recorded) or significant (high probability that no audio is recorded).

During power up, significant failures only will be reported by the red FAIL light coming on steady on the CVR control unit. This FAIL light can be cleared by pushing the SELF TEST button on the control unit if there is no longer an error. A self test should be performed following the report of a significant error to confirm the error is in fact significant.

During the on demand self test, an inspection of a memory array verify error count is performed, if the error count is greater than the allowed tolerance, a flash (or steady) code will be displayed on the red FAIL light on the CVR control unit.



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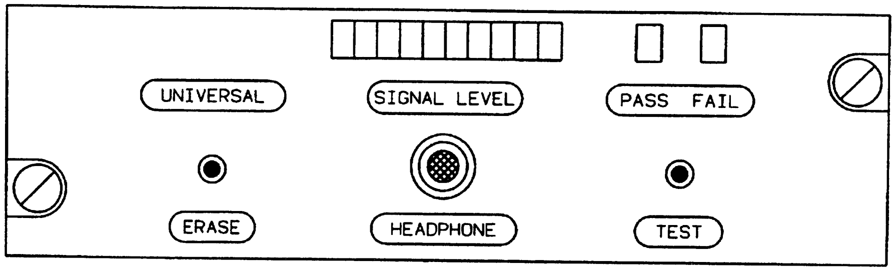

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UNIVERSAL NAVIGATION CVR-30B COCKPIT VOICE RECORDER - REMOVAL/INSTALLATION

WARNING: WHEN DOING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES (INCLUDING BATTERIES) ARE DISCONNECTED.

WARNING: DO NOT REMOVE THE UNDERWATER LOCATOR BEACON BATTERY. HAZARDOUS CHEMICALS MAY BE RELEASED AND THE MANUFACTURERS WARRANTY WILL BECOME VOID.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, WATER, DRAIN AIR CONDITIONING AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

NOTE: Information qouted in paragraph 1, General and paragraph 3. Close Up is applicable to the Removal/Installation of ALL equipment in this system.

1. General

A. Preliminary Procedures

(1) Open, safety and tag the following circuit breaker

Panel	Label
DA-A	CVR

NOTE: The removal and installation of the Cockpit Voice Recorder and Controller is considered self evident therefore no instructions are detailed.

NOTE: The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 31, INSTRUMENTS GENERAL and Chapter 34, AVIONICS GENERAL in the Maintenance Manual Addenda for that particular airplane.

NOTE: When Removing/Installing any Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda proced

2. Underwater Locator Beacon

A. Removal

(1) Remove the cockpit voice recorder from its tray.

(2) Remove the nuts from the securing plate on the top of the mounting cradle.

(3) Remove the securing plate.

(4) Remove the beacon from the mounting cradle.

B. Underwater Locator Beacon Installation

(1) Install the beacon in the mounting cradle.

(2) Make sure that the water switch is facing down. This is to prevent accumulation of dirt, grease and water.

(3) Install the securing plate.

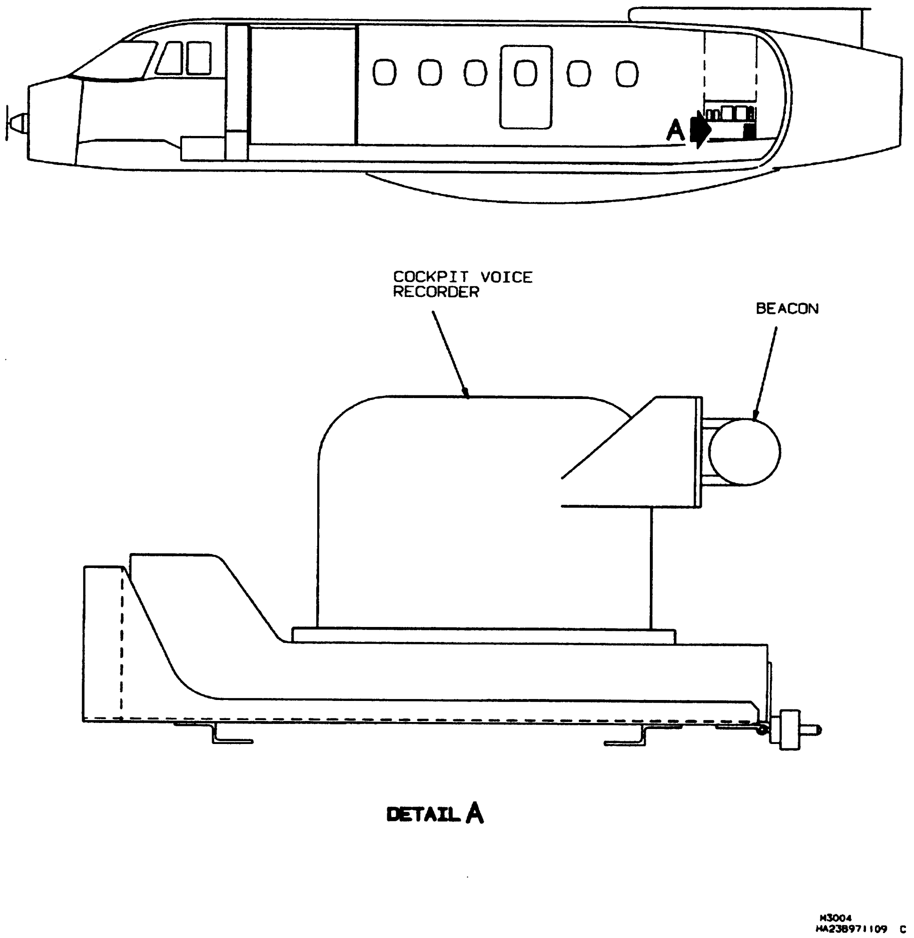
(4) Install the securing nuts.

3. Close Up and Test

(1) Remove the safety clip and tag and close the circuit breaker opened in paragraph 1.A.(1).

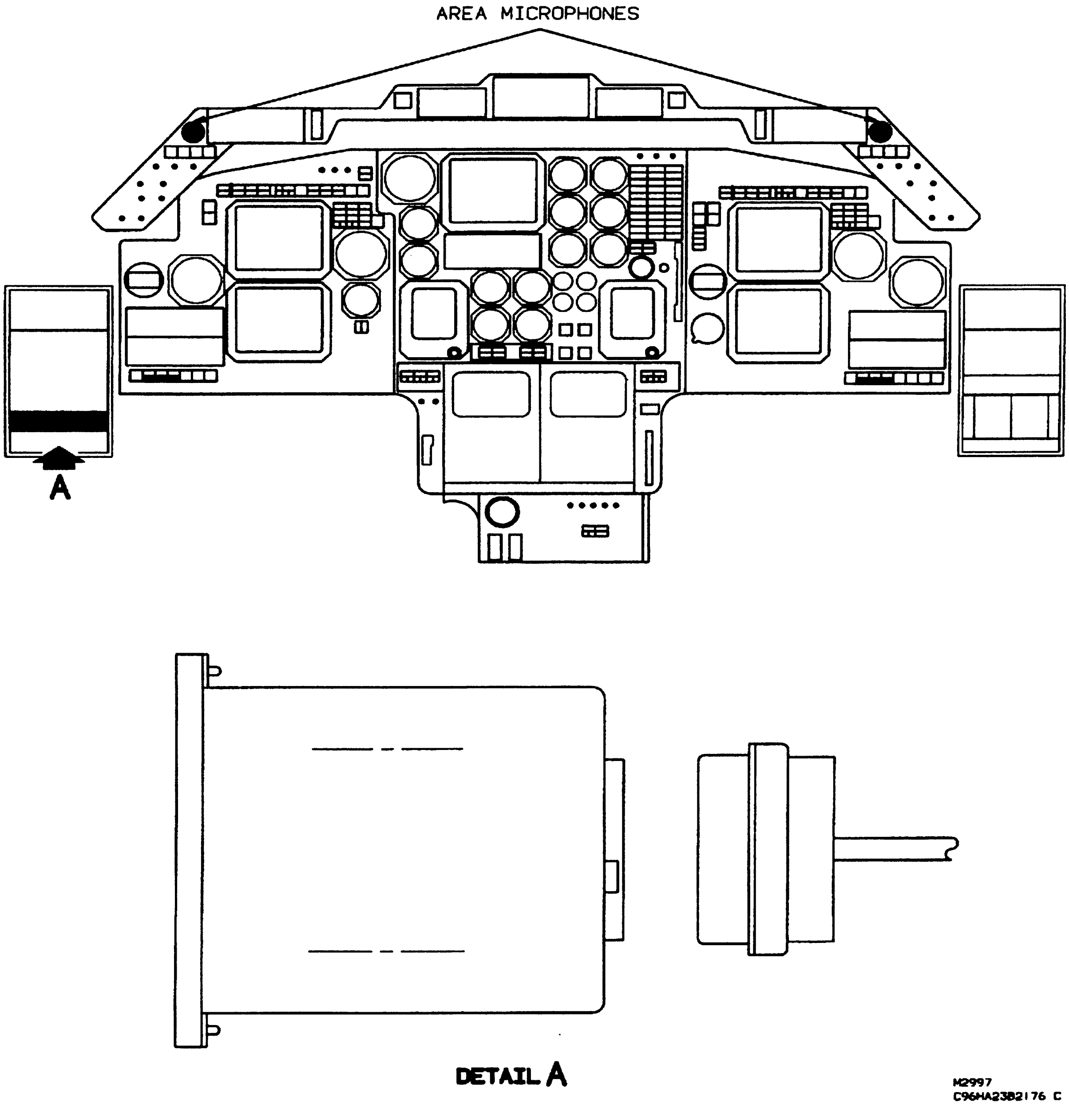
(2) Do a operational check of the cockpit voice recorder and a functional test of the underwater location beacon (ADJUSTMENT TEST).

(3) Make sure the working area is clean and clear of all tools and miscellaneous equipment.



Cockpit Voice Recorder - typical

Figure 401



CVR Controller - typical
Figure 402

UNIVERSAL NAVIGATION CVR-30B COCKPIT VOICE RECORDER

ADJUSTMENT/TEST

1. General

NOTE: *When using any test set/equipment, use in accordance with the test set/equipment manufacturers instructions.*

NOTE: *When operating any other systems referred to in this procedure, make sure ALL operations are done in accordance with the instructions in the relevant AMM or MMA.*

A. Preliminary Procedures

Action		Result
(1) Energize the aircraft busbars (AMM, Chapter 24).	...	-
(2) Set RADIO 1 and RADIO 2 switches to on.	...	Make sure the OFF legends go off and the ON legends come on.
(3) Make sure the audio integrating system is serviceable.	...	-

2. Test Procedures

A. Operational Test - CVR:

Equipment/Materials	Supplier
Headset, one.	Local supply.
Universal 1623-1 Test Set	Local supply

Procedure :

Action		Result
(1) Put on the headset and plug into the control unit headphone jack.	....	-
(2) Push the TEST button on the control unit. Hold for one second and release.	...	This starts the cockpit voice recorder self test. During self test the PASS and FAIL lights will come on alternately, indicating the self test is in progress. The self test takes approximately 15 seconds.

Action		Result
(3) Speak into the headset (10 seconds after completion of self test).	...	Cockpit conversation will be heard through the headset and visible on the SIGNAL LEVEL indicator. The test tone audio will be heard. No audio will be recorded during self test.

NOTE: The self test will not start if the ERASE feature is in progress.

B. Failure Conditions -CVR

Number of FAIL flashes	CVR conditions	FAIL light	PASS light
None	Pass	Off	On
1	Channel 1 fail	On	Off
2	Channel 2 fail	On	Off
3	Channel 3 fail	On	Off
4	Channel 4 fail	On	Off
5	Flash memory fail	On	Off
Steady	General fail (Note 1)	On	Off
Alternating	System test in progress	Alternating	Alternating
Simultaneous	Bulk erase	Simultaneous	Simultaneous

NOTE: General fail is a miscellaneous failure of channel 5, 6, Frequency Shift Keying (FSK), ARINC Channels etc. The BITE status code indicates which function has failed. Please contact Universal Avionics for assistance with determining a particular BITE status failure indication.

NOTE: Should self test fail and it is desired to do another self test, the TEST button must be pushed firmly for at least one second to engage self test.

C. Bulk Erasure - CVR

Action		Result
(1) Open the L/H squat switch.	...	-
(2) Push the ERASE button for at least five seconds and release.	...	The erase function does not occur.
(3) Close the L/H squat switch.	...	-
(4) Push the ERASE button for five seconds and release.	...	The erase function starts. The PASS and FAIL lights flash simultaneously. The SIGNAL LEVEL indicator modulates with cockpit audio. Erase takes approximately 10 seconds.

D. Test Procedure (Underwater Location Beacon)

NOTE: *The DK100 beacon requires no battery maintenance. Do not remove the battery at any time. The beacon must be removed from service according to the expiration date printed on the*

NOTE: *beacon case and returned to the manufacturers for servicing.*

Action		Result
(1) Make sure the REPLACE BATTERY BY date on the ULB is current.	...	-
(2) Short the water switch on the beacon between the center pin and the casing, using the shorting tab assembly from the PL-1 test set.	...	-
(3) Place the PL-1 on the beacon body approximately one inch from the water switch end.	...	-
(4) Push and hold the operation button on the PL-1.	...	The light on the PL-1 flashes with each output pulse of the beacon.

NOTE: *Before doing steps (5) and (6) make sure the beacon case and water switch are clean and dry. If necessary, or if there is any doubt, wipe the case and switch using a mild detergent and a soft cloth.*

Action		Result
(5) Place the negative lead of a high impedance voltmeter (input impedance of 10 Mohms) on the water switch pin and the positive lead of the meter on the beacon case or mounting kit.	...	-

NOTE: Before doing step (6), check the label on the beacon to determine battery code.

Action		Result
(6) Measure the battery voltage.	º	The Minimum Acceptable Voltage (MAC) for "code A" batteries is 3.55 volts. The MAC for "no code" batteries is 7.10 volts. Return the beacon to the manufacturers if the voltage is below these figures.

3. Close Up

Action		Result
(1) Remove the test set.	...	-
(2) Set the RADIO 1 and RADIO 2 switches to off.	...	Make sure the ON legends go off and the OFF legends come on.
(3) De-energize the airplane busbars (AMM, Chapter 24).	...	-
(4) Remove the headset from the aircraft.	...	-
(5) Make sure the working area is clean and clear of all tools and miscellaneous equipment	...	-

UNIVERSAL NAVIGATION CVR-30B COCKPIT VOICE RECORDER - INSPECTION/CHECK

1. Inspection

Periodic inspection of the CVR-30B consists of the pre-flight self test. Only if the self test fails is maintenance required on the Cockpit Voice Recorder.

The switch end of the Underwater Locator Beacon (ULB) must be cleaned periodically to prevent leakage currents from occurring. A dirty switch will decrease the battery life. Any time contamination of the water activation switch is seen then the switch must be cleaned. The ULB functional test must be done every 24 months.

HONEYWELL RM-850 RADIO MANAGEMENT UNIT DESCRIPTION AND OPERATION

1. Description

The RM-850 is a self contained unit used to control the navigation and communication radio systems as well as the ATC transponder.

Two units are installed and each can control both radio systems. The units installed are normally located in the center instrument panel. The left unit is designated as RMU 1and controls the COM 1, NAV 1, ADF 1, and ATC 1 systems. The right unit is designated as RMU 2 and controls the COM 2, NAV 2, ADF 2, and ATC 2 systems. Cross side control is available by pushing the 1/2 switch on either RMU.

Both RM-850s require 28v dc power. The pilot's RMU gets its power from the PE bus through a circuit breaker and RADIO 1 switch. The copilot's RMU gets its power from the PS2 bus through a circuit breaker and RADIO 2 switch.

Each RM-850 has a connector at the rear to interface with the power supplies and the other systems of the airplane. The RMU is a color cathode ray tube (CRT) based control unit, using the concept of selecting a function by pushing a line select key (LSK) that is adjacent to the parameter to be changed. Any selectable parameter may be changed by pushing the corresponding LSK adjacent to the displayed parameter and turning the tuning knobs.

The RMU main tuning page is divided into four dedicated windows: COM, NAV, ATC and ADF. Each window groups the data associated with a particular function and displays the frequency, or code and operating mode.

The RMU has other display modes, called pages, which have additional features and functions for the control of the radio system.

The pilot's RMU, ATC 1, COM 1, NAV 1 and clearance delivery control may be powered by a red guarded RADIO EMERG switch located on top of circuit breaker panel DA-A. This switch permits use of the above listed equipment directly from battery No. 4 without powering the entire airplane.

2. Operation *(Figure 1)*

The flight management system (FMS) can be used to tune some radio systems. The RMU acts as an interface between the FMS and the system to be tuned. The FMS tuning signals go into the RMU, and are then distributed in the same way as the tuning knob signals. In this way the FMS information is presented to the system in an organized manner and appears to the system as though the pilots are tuning the system.

If any of the radio systems fail to respond to commands from the RMU, the frequencies or operating commands associated with the particular function are removed from the RMU and replaced with dashes. This alerts the crew to the fact that there is a fault in a system.

The RMU also has a ground maintenance mode. In this mode, various pages are utilized to give maintenance personnel access to maintenance log data and operating conditions of the systems. In the maintenance mode, parameters may only be examined; they cannot be changed in any way.

A. Radio Management Controls

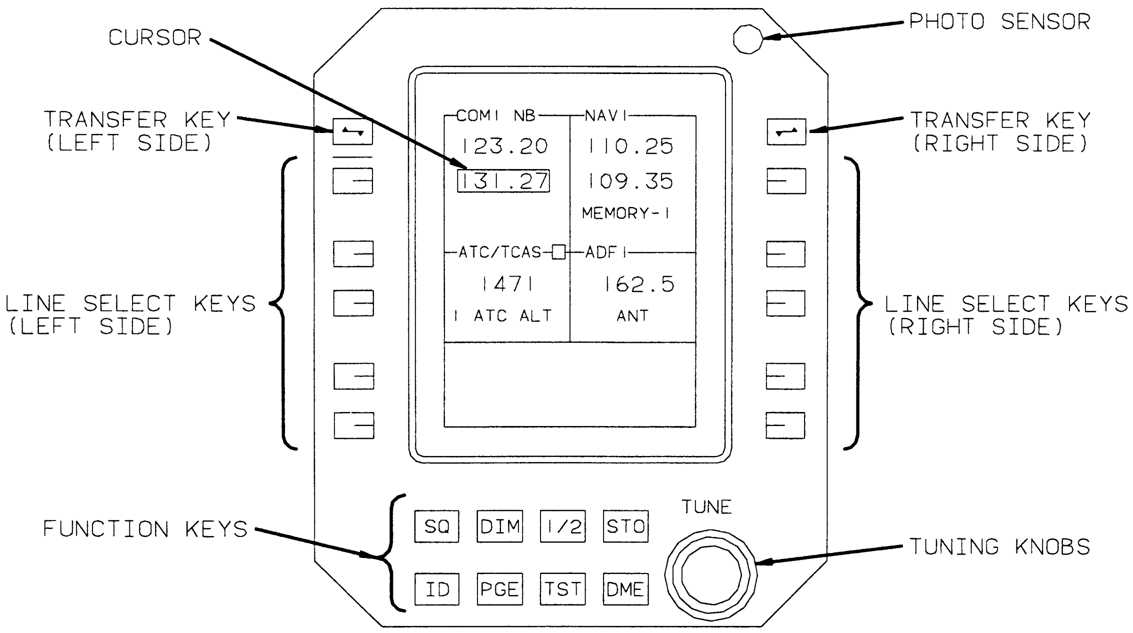
Transfer Key	...	The transfer key, when pushed, switches the active frequency (top line) and the preset frequency (second line) of the window.
Line Select Key	...	The first push of the line select key (LSK) moves the yellow cursor to surround the data field associated with that particular line select key. This then electronically connects that data field to the tuning knobs so the frequency or mode may be changed. For some functions, additional pushes of the LSK will toggle modes or recall stored frequencies. These are covered in the individual function operation descriptions. The line select key, if held for certain functions, permits ADF and ATC memories to be recalled and to enter and exit the direct tune mode for the COM and NAV.
Cursor	...	The yellow cursor encloses the data field selected by the line select key. Home is the entire preset section of the COM window.
Tuning Knobs	...	The tuning knobs are used to modify the data field enclosed by the cursor. This may be frequency or mode, depending upon the data field.

Functions keys associated with the integrated radio system operate as follows:

Squelch (SQ) Key	...	Pushing this button causes the COM radio to open its squelch and let any noise or signal present in the radio be heard on the audio system. The squelch button is strictly a toggle. The letters SQ are annunciated along the top line of the COM window when the squelch is opened.
Dimming (DIM) Key	...	Pushing the DIM button connects the RMU brightness control to the tuning knob permitting the display to be adjusted to match overall cockpit brightness.
Cross Side (1/2) Key	...	Pushing this key transfers the entire RMU operation and display to the cross side system. The legend color changes from white to magenta when one system is being controlled by the RMU associated with the cross side system.
Store (STO) Key	...	Pushing this key causes a temporary (TEMP) COM/NAV preselect frequency to be stored in memory and assigned a numbered location, provided the cursor has first been placed around that frequency. The ADF and ATC each have one memory location. Pushing the STO key causes the current ADF frequency or ATC code to be stored in memory, provided the cursor has first been placed around that value.
Ident (ID) Key	...	Pushing the ID key places the transponder in the identification response mode. The ident squawk terminates after 18 seconds.
Page (PGE) Key	...	Pushing the PGE button once will change the RMU display to the COM preset frequency memory page. Pushing it a second time will move the display to the NAV preset frequencies page. Keying PGE a third time calls up the discrete RADIO ON/OFF page which is the last page of the RMU program. A fourth push of the PGE button will return the display to the main page. All of these back pages assign a RETURN function to the lower left line select key. Pushing this key will bring back the FRONT page.

NOTE: The RADIO ON/OFF page can be disabled by a strap input into the RMU.

Test (TST) Key	Pushing TST causes the component associated with the cursor's present position to activate its internal self test circuits for a complete end to end test of the function. Hold the TST button down for the duration of the test, about two seconds for COM transceiver, five to seven seconds for DME, ATC, ADF, and about 20 seconds for NAV (VOR/ILS). Releasing the TST button at any time immediately returns the functions to normal operation. If the TST button is held for 30 seconds or more, the radios are automatically commanded back into normal operation.
DME Key	Pushing DME disengages the DME from the active VOR frequency and permits tuning of a different DME channel without changing active VOR (DME Hold). Successive pushes of the DME key enables display and selection of the DME channels in VHF.



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RM-850 Radio Management Unit
Figure 1

NOTE: Figure 1 shows the indication for an airplane with TCAS - airplanes without TCAS will have TCAS missing from the ATC window.

HONEYWELL RM-850 RADIO MANAGEMENT UNIT TROUBLESHOOTING

1. RMU/SYSTEM TEST PAGE DECISION TREE

Error Message	Meaning	Action	Decision
PRI BUS SEC BUS NAV UNIT/ COM UNIT	Full RMU communications with all COMs, NAVs, and cross-side RMU cannot be established on the primary bus. Full RMU communications with the on-side COM and NAV cannot be established using the secondary bus. The NAV unit and/or COM unit cannot fully communicate with both RMUs over primary bus and/or the on-side RMU over secondary bus.	(1) Make sure that all radio circuit breakers are on. (2) Make sure RMU On-Off page all functions are ON. (3) Make sure that AUX control heads are OFF or that Clearance Delivery Unit is not in EMERG mode. (4) If 1, 2, or 3 are cause of error, correct and turn RMU power off for ten seconds. Reapply power to start new POST. (5) If error still exists, perform on-side and cross-side tuning of all radios and activate auxiliary tuning sources to determine which functions are still available.	Any of these messages indicate that system redundancy has been reduced. The decision to dispatch is made by the pilot. If any question remains, consult with qualified maintenance person.
RMU ERR	One or more internal parameters were measured to be outside their self-test limit.	(1) Make sure that AUX control heads are OFF or that Clearance Delivery Unit is not in EMERG mode. (2) On main tuning page, perform tuning test on all radios by setting frequency and determining that radio is operating.	If tuning test fails, this RMU is not fully operational. If other RMU is operable, the decision to dispatch is made by the pilot.

2. SYSTEM STATUS MESSAGE CHECKS *(Figure 101)*

The procedures in this section are to be used to check the maintenance log to determine if any errors have been entered into the log.

(1) Simultaneously push the COM and NAV transfer buttons (top button on each side of the RMU). Make sure the RMU display leaves its normal operating mode and shows a menu which allows the operator to enter the maintenance mode.

(2) The maintenance mode is available on the ground only. In the maintenance mode, various pages are available giving access to the maintenance log data, software versions, strap option settings, operating parameters and conditions.

To access the maintenance mode, simultaneously push the left and right transfer keys. This brings into view the MAINTENANCE DATA SYSTEM page which shows a menu. The menu permits selection of the following additional menus:

- STRAPS
- SOFTWARE VERSIONS
- MAINTENANCE LOG
- RMU SETUP

To access these menus, push an LSK (left or right) adjacent to the required menu. To return to the main tuning page, push either the bottom left LSK or the PGE key. To select System 1 or 2, push the 1/2 key. The bottom left LSK and the 1/2 key have the same function on any page selected in the maintenance mode. If one of the above menus has been selected, to return to the MAINTENANCE DATA SYSTEM page push the bottom right LSK.

The STRAPS menu page permits the operator to select straps pages for the RMU, COM UNIT and NAV UNIT. To select a page, push the LSK adjacent to the required straps page. This shows the operator how the unit is configured.

The SOFTWARE VERSIONS page lets the operator see what version of software is associated with each system within the integrated radio system.

With the MAINTENANCE DATA SYSTEM page in view, pushing the LSK adjacent to the MAINTENANCE LOG field brings the MAINTENANCE LOG SYSTEM page into view. This page lets the operator select the maintenance log for the COM UNIT, NAV UNIT or RMU, and for each system within the integrated radio system. Pushing the LSK adjacent to the required field brings the appropriate MAINTENANCE LOG into view.

The maintenance log pages show the following information:

- Current power on count (POC).
- Number of errors that have been entered in the log.
- Five columns headed, POC, TIME, TMP, ER and DESCRIPT.

POC column lists the POC at the time of the failure.

TIME column lists the number of minutes after power was initially applied that the fault occurred.

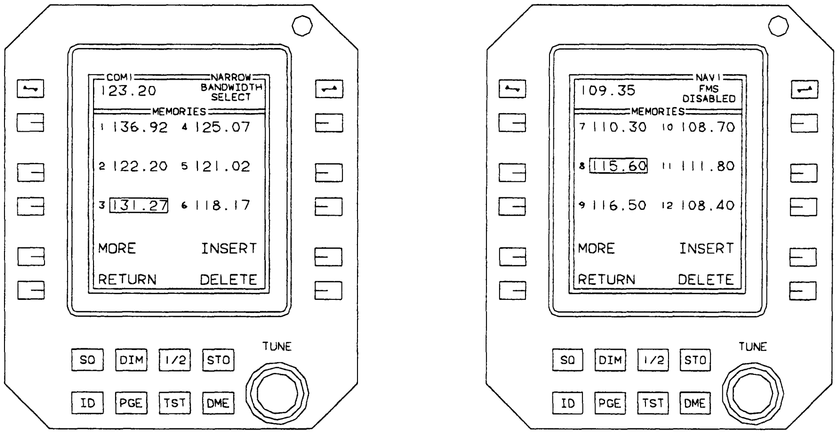
TMP column lists the temperature in degrees C within the unit at the time of the failure.

ER column lists the hex error code.

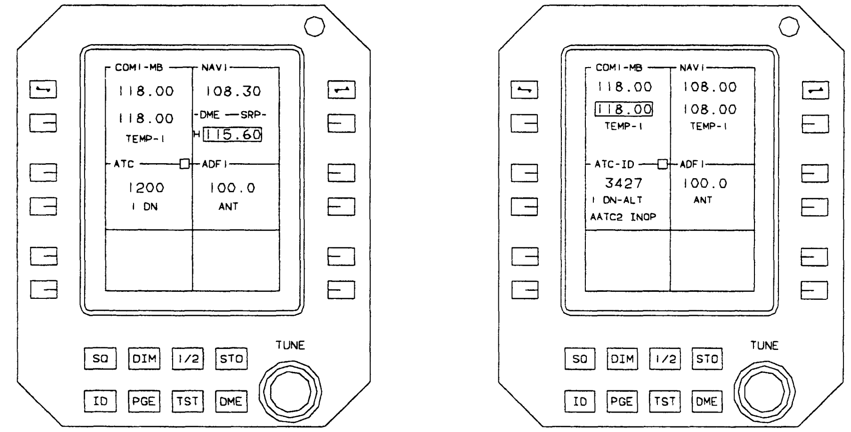
DESCRIPT column gives an eight character description of the failure, refer to TYPICAL (VHF COM) ERROR CODES table.

3. TYPICAL (VHF COM) ERROR CODES

Continuous Monitoring Error Code (hex)	PAST/POST Error Code (hex)	8 Character ASCII Description	Error Description
21	A1	PWR SPLY	5 volt power supply
22	A2	PWR SPLY	+15 volt power supply
23	A3	PWR SPLY	+60 volt power supply
24	A4	PWR SPLY	+16 volt power supply
25	A5	PWR SPLY	-5 volt power supply
26	A6	COM TUNE	VCO tune voltage
27	A7	OVERHEAT	Heat sink temperature
28	A8	COM RCVR	Preselector tune volts
29	A9	COM RCVR	Receiver AGC
2A	AA	COM TUNE	VCO RF voltage
- -	AB	SQUELCH	Noise squelch
- -	AC	SQUELCH	Carrier squelch
2D	- -	COM XMTR	XMTR forward output power
2E	- -	COM XMTR	XMTR reverse output power
2F	AF	MODULATR	XMTR final stage dc volts
30	B0	PWR SPLY	+28 AUX CDC power supply
31	B1	COM TUNE	Synthesizer lock
32	B2	COMPUTER	Processor int. RAM failure
33	B3	COMPUTER	Processor ext. ROM failure
34	B4	AUXILARY	AUX CDC invalid
35	B5	AUXILARY	AUXILARY AUX CDC time out failure

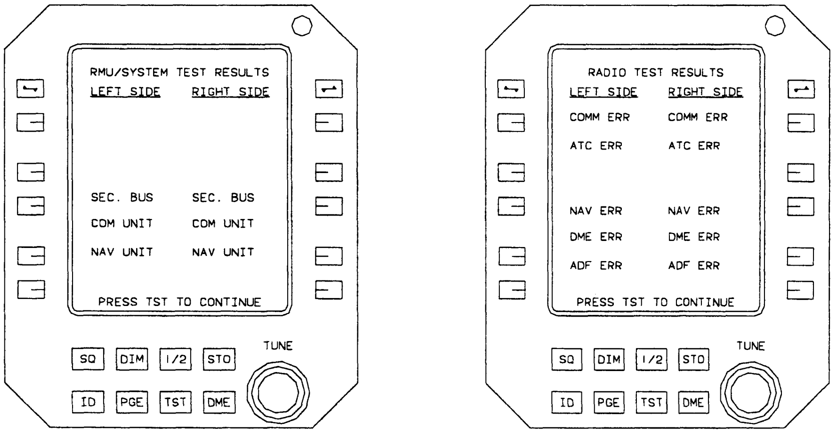


MEMORY PAGES



DME SPLIT TUNING DISPLAY

ATC FAILURE WARNINGS



POST RESULTS PAGES

M3253
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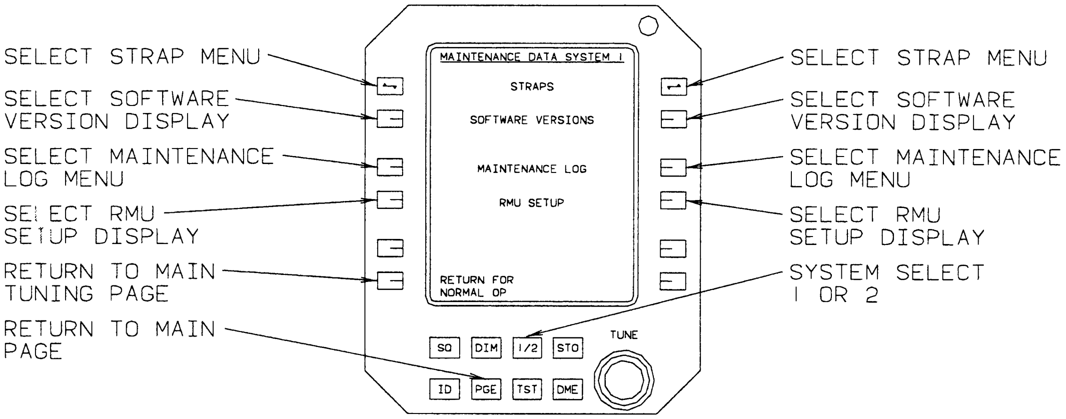
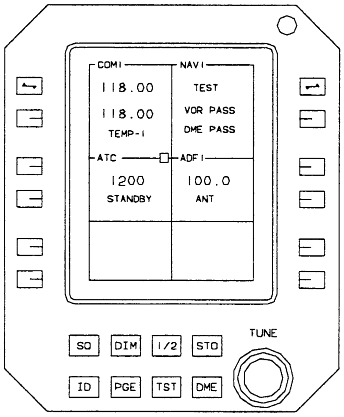
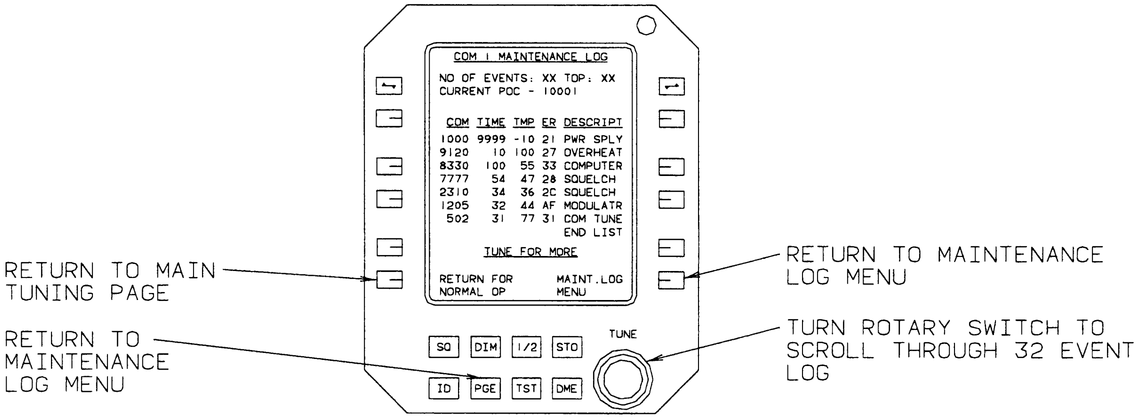
RMU Display Pages
Figure 101 (Sheet 1 of 3)



MAINTENANCE MENU SELECTION PAGE



SELF-TEST WINDOW EXAMPLE



MAINTENANCE LOG DISPLAY PAGE

M3254
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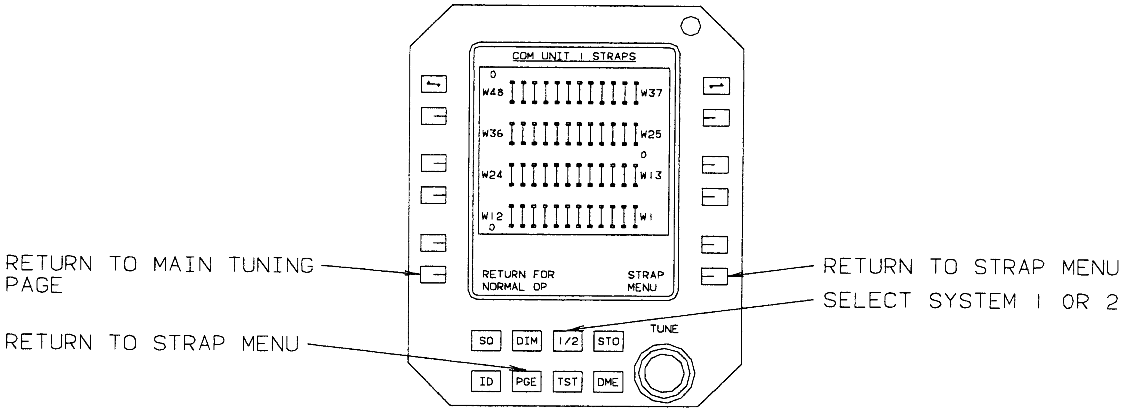
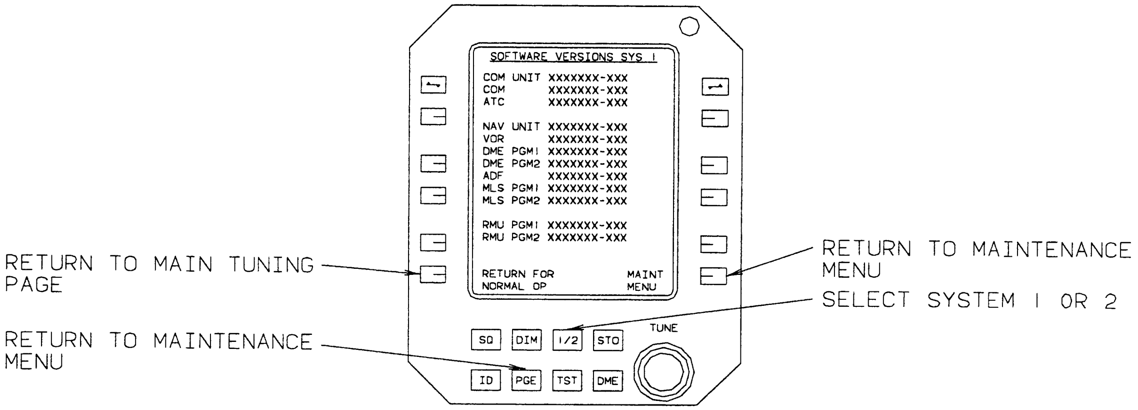
RMU Display Pages

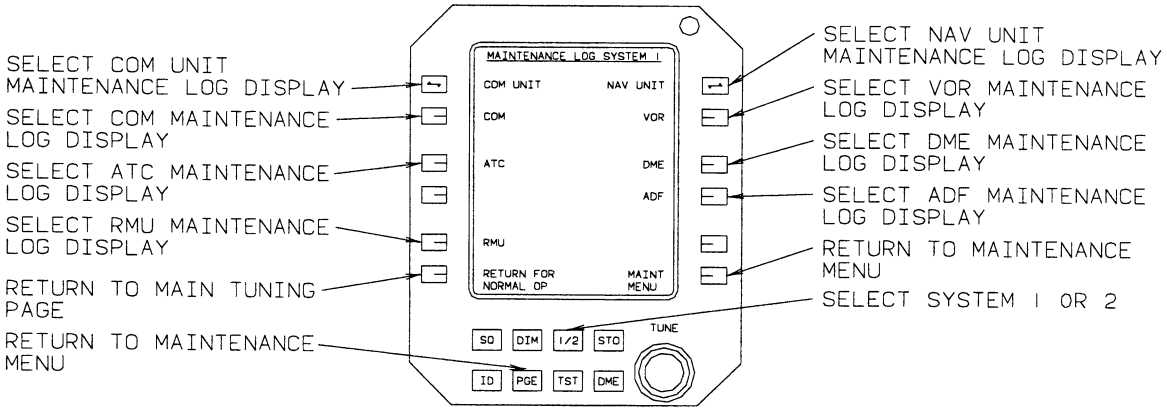
Figure 101 (Sheet 2 of 3)



STRAP DISPLAY PAGE



SOFTWARE VERSIONS DISPLAY MENU


MAINTENANCE LOG SYSTEM 1
COM UNIT
NAV UNIT
COM
VOR
ATC
DME
ADF
RMU
RETURN FOR NORMAL OP
MAINT MENU
SQ
DIM
1/2
STO
TUNE
ID
PGE
TST
DME
SELECT COM UNIT MAINTENANCE LOG DISPLAY
SELECT COM MAINTENANCE LOG DISPLAY
SELECT ATC MAINTENANCE LOG DISPLAY
SELECT RMU MAINTENANCE LOG DISPLAY
RETURN TO MAIN TUNING PAGE
RETURN TO MAINTENANCE MENU
SELECT NAV UNIT MAINTENANCE LOG DISPLAY
SELECT VOR MAINTENANCE LOG DISPLAY
SELECT DME MAINTENANCE LOG DISPLAY
SELECT ADF MAINTENANCE LOG DISPLAY
RETURN TO MAINTENANCE MENU
SELECT SYSTEM 1 OR 2

MAINTENANCE LOG MENU PAGE

M3255
C95HA23C0829 AI

RMU Display Pages
Figure 101 (Sheet 3 of 3)

HONEYWELL RM-850 RADIO MANAGEMENT UNIT REMOVAL AND INSTALLATION

WARNING: DURING ANY MAINTENANCE INVOLVING ELECTRICAL WIRING, MAKE SURE ALL ELECTRICAL POWER SOURCES, (INCLUDING BATTERIES) ARE DISCONNECTED.

CAUTION: WHEN REMOVING INTERIOR ITEMS, MAKE SURE ALL ELECTRICAL CONNECTIONS, WATER, DRAIN, AIR CONDITIONING AND OXYGEN LINES ARE SECURED IN ACCORDANCE WITH STANDARD AIRCRAFT MAINTENANCE PROCEDURES.

NOTE: *Information qouted in paragraph 1.A. General and para.1.B. Close Up is applicable to the Removal/Installation of ALL equipment in this system.*

1. General

Equipment/Material	Part/Item No.
Circuit breaker safety clips and tags	Operator supplied

A. Premilinary procedures

(1) Open, safety and tag the following circuit breakers:

Panel	Label
DA-A	RMU 1
DA-A	RMU 2

NOTE: *The removal and installation of the Radio Management Unit is considered self evident therefore no instructions are detailed.*

NOTE: *The location of equipment may vary on some airplanes. For the location of equipment on a particular airplane refer to Chapter 31, INSTRUMENTS GENERAL in the Maintenance Manual Addenda for that particular airplane.*

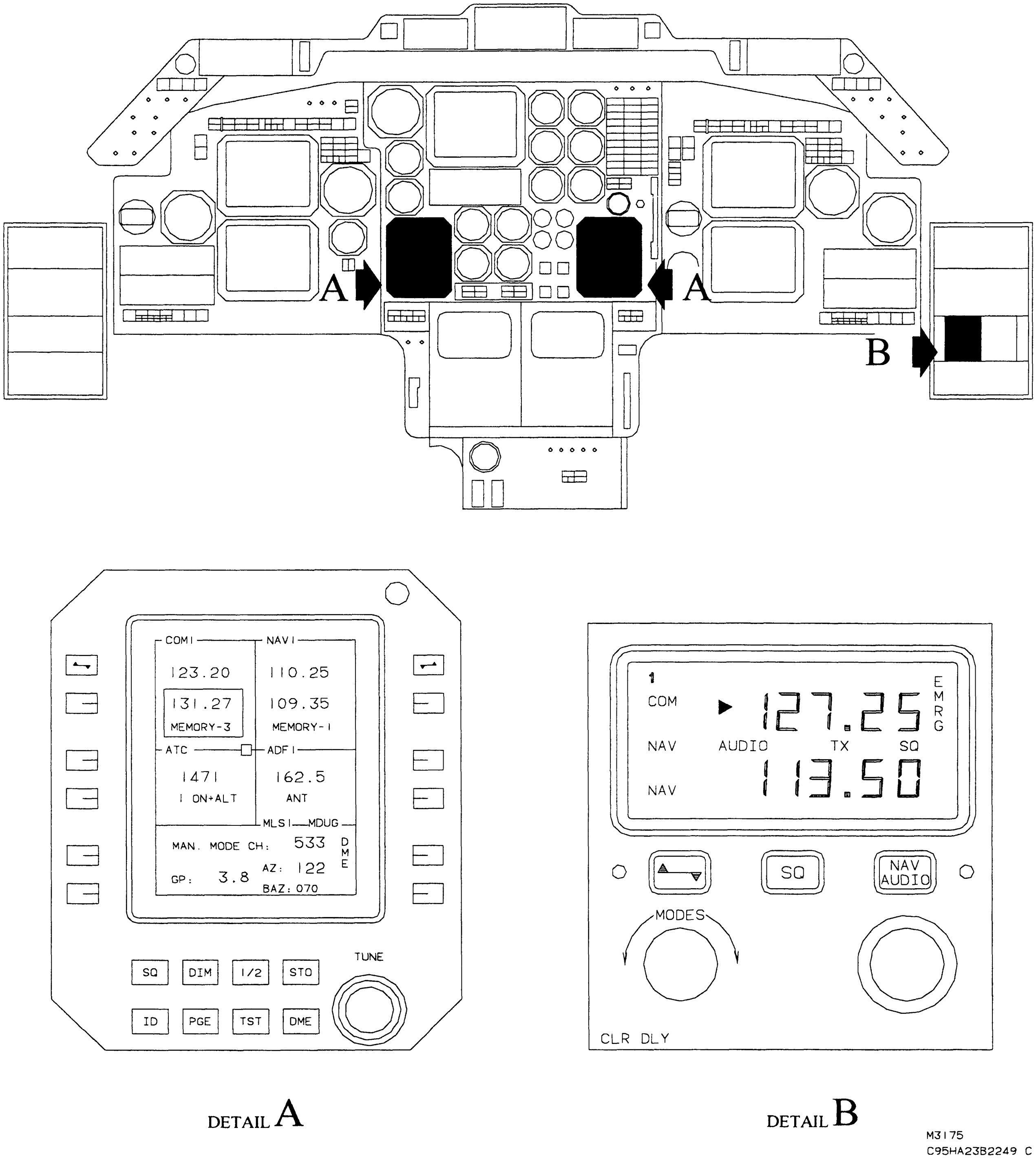
NOTE: *When Removing/Installing any Equipment/Furnishings to gain access to equipment make sure the Removal/Installation is done in accordance with Aircraft Maintenance Manual Procedures or Maintenance Manual Addenda proced*

B. Close Up and Test

(1) Close circuit breakers opened at paragraph 1.A.(1)

(2) Make sure working area is clean and clear of all tools and miscellaneous equipment.

(3) Do an operational test of the RMU (ADJUSTMENT/TEST).



DETAIL A

DETAIL B

Communications Equipment Locator

Figure 401

HONEYWELL RM-850 RADIO MANAGEMENT UNIT ADJUSTMENT/TEST

1. Procedures

ACTION	RESULT
Bus Operation Test	
NOTE: The pilot's RMU is supplied from the PE/4th BATTERY BUS via circuit breaker RMU 1 *The copilot's RMU is supplied from the PS 2 RADIO BUS via circuit breaker RMU 2.*	
(1) Energize the airplane busbars (AMM, Chapter 24, GENERAL) ...	-
(2) On the central instrument panel, push the RADIO 1 and RADIO 2 switches. ...	• Make sure the OFF legend goes off and the ON legend comes on. • Make sure that upon initial application of power, the RMU copyright page appears for approximately 45 seconds during which time the power on self test (POST) is being performed. If no errors are detected, the main tuning page will be displayed after completion of the POST. If an error is detected, it will be displayed on either an RMU/SYSTEM TEST RESULTS page or a RADIO TEST RESULTS page. If an error is displayed, ignore the test results at this time and go to the main page by momentarily pushing the TST button on the RMU.
(3) Set maintenance menu page on the RMU by simultaneously pushing the COM and NAV transfer buttons (top button on each side of the RMU). ...	-
(4) Set the RMU SETUP menu. ...	The RMU should indicate MLS OFF. If the RMU indicates MLS ON, momentarily push the line select button adjacent to the MLS ON display. The display should change to MLS OFF.

ACTION	RESULT
(5) Return to the main page as indicated by the instructions on the RMU.	If the MLS window was turned off, the MLS window on the RMU should be blank. If the MLS window was left on, the MLS display window should be on.

NOTE: In the following step, the page is displayed but has no effect on the system operation.

ACTION	RESULT
(6) Set the RMU ON/OFF control page (back page) by pushing the PGE button three times.	Make sure the power control function of all applicable system units is ON. If the power control for a desired unit is OFF, push the line select button adjacent to that unit to turn the power ON.

NOTE: Only the on side radios can be affected while on this page.

ACTION	RESULT
(7) Momentarily push the COM line select button on the RMU.	Make sure the yellow cursor box moves to line 2 of the COM window.
(8) (a) Turn the RMU tuning knobs.	(a)Make sure the COM frequency changes.
(b) Push the COM transfer button.	(b)Make sure the active and temporary frequencies switch locations.
(9) Push and hold the COM line select button on the RMU.	Make sure the yellow cursor box moves to line 1 of the COM window for direct tuning.
(10) Momentarily push the transponder code line select button on the RMU.	Make sure the yellow cursor box moves to line 1 of the ATC window.
(11) Turn the RMU tuning knobs.	Make sure the ATC codes change.
(12) Push and hold the transponder mode line select button on the RMU.	Make sure the active ATC code is replaced by the stored ATC code.
(13) Momentarily push the transponder mode line select button on the RMU.	Make sure the yellow cursor moves to line 2 of the ATC window.
(14) Turn the RMU tuning knobs.	Make sure the ATC operating modes change.
(15) Momentarily push the transponder mode line select button on the RMU.	Make sure the mode changes from System 1 (ATC ON, ATC ALT) to STANDBY.

ACTION	RESULT
(16) Momentarily push the NAV line select button on the RMU.	Make sure the yellow cursor box moves to line 2 of the NAV window.
(17) Turn the RMU tuning knobs.	Make sure the NAV frequency changes.
(18) Push the NAV transfer button on the RMU.	Make sure the active and temporary frequencies switch locations.
(19) Push and hold the NAV line select button on the RMU.	Make sure the yellow cursor box moves to line 1 of the NAV window for direct tuning.
(20) Momentarily push the DME button on the RMU.	Make sure the NAV window goes into the split mode with the DME on the bottom (line 2).
(21) Turn the RMU tuning knobs.	Make sure the DME frequency changes.
(22) Momentarily push the DME button on the RMU	Make sure the NAV window is no longer in the split mode.
(23) Momentarily push the ADF frequency line select button on the RMU.	Make sure the yellow cursor box moves to line 1 of the ADF window.
(24) Turn the RMU tuning knobs.	Make sure the ADF frequency changes.
(25) Momentarily push the ADF frequency line select button on the RMU.	Make sure the yellow cursor box moves to line 2 of the ADF window.
(26) Turn the RMU tuning knobs.	Make sure the various ADF operating modes (ADF, BFO, VOICE, ANT) cycle through the window. If any of the frequency, code, or mode functions fail (dashes in cursor box), the most probable cause will be a miswired bus. Remove all power and check bus wiring.
(27) Set the maintenance menu page on the RMU by simultaneously pushing the COM and NAV transfer buttons (top button on each side of the RMU).	Make sure the RMU leaves its normal operating mode and displays a menu allowing the operator to enter the aircraft maintenance mode.
(28) Set the STRAP menu and check the strap display of each unit (COM UNIT, NAV UNIT and RMU).	Make sure the proper strap options have been incorporated.
(29) Repeat Steps 6 through 27 for system 2 radio components.	-

ACTION	RESULT
(30) Remove all radio system power.	-
Power On Self Test (POST)	
(31) Make sure all radio system power is OFF.	-
(32) To make sure of proper POST sequencing, apply 28v dc power to all system 1 components. Make sure that power is applied to all components simultaneously.	Make sure upon initial application of power to the RMU, the copyright page comes up for approximately 45 seconds. During this time the system will automatically perform a power on self test (POST). If no errors are detected, the main tuning page will then be displayed. If an error is detected, it will be displayed on either an RMU/SYSTEM TEST RESULTS page or a RADIO TEST RESULTS page. Annotate all errors for later troubleshooting. Momentarily push the TST button on the RMU to proceed to the main tuning page.
(33) Repeat steps 30 and 31 for system 2 radio components.	-
Power ON/OFF Check	
(34) (a) Set the RMU ON/OFF control page (back page) on the RMU.	(a)Make sure that non-emergency radio frequencies, codes and channel windows display dashes, indicating that power to the remote unit is off.
(b) Turn off all radio functions by pushing the associated line select button.	(b)Make sure that emergency radio frequencies, codes, and channel windows display their normal data and do not dash out.
(c) Return to the main tuning page.	-

ACTION	RESULT
(35) Return to the RMU ON/OFF control page (back page) and turn power ON to all units.	Return to the main tuning page and make sure that all frequencies, codes and channels are displayed as before.
(36) Repeat steps 33 and 34 tests for the copilot's equipment.	Same results as steps 33 and 34 on copilot's equipment.
(37) Momentarily push the 1/2 button on the RMU.	Check the cross side operation by making sure that RMU No. 1 (pilot's) can control system No. 2 (copilot's) radios.
(38) Repeat Step 36 above by making sure that RMU No. 2 (copilot's) can control System No. 1 (pilot's) radios.	-
(39) On the center instrument panel, push the RADIO 1 and RADIO 2 switches	Make sure the ON legend goes off and the OFF legend comes on.